Physiological and Biological Thinking in Late Nineteenth-Century English Medicine with Reference to Clifford Allbutt

by

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Abstract

Individual physicians' medical thinking is one of the aspects which has not been fully explored in the present historiography of English medicine. In this thesis, I examine the medical thought of Clifford Allbutt who was Regius Professor of Physic at Cambridge University from 1892 to 1925. He was the designer of the 3-inch thermometer that we use today and was an advocate of the use of the ophthalmoscope in general medicine, the integration of medicine with surgery and the basic sciences, the physiological concept of disease, and comparative pathology. I argue that all these projects were concerted efforts to make medicine a biological science and they were guided by Allbutt's physiological and biological thinking.

I examine Allbutt's medical thinking under three headings: (1) medical generalism, (2) the concept of disease, and (3) comparative pathology. In chapter two, I discuss how Allbutt attempted to make late nineteenth-century English clinical medicine an on-going research enterprise, through his own experience in ophthalmic and thermometric research. In chapter three, I discuss Allbutt's protest against the divorce of physic and surgery and his advocacy of the hospital unit system. My discussions in these two chapters will explain Allbutt's medical generalism. Chapter four looks at Allbutt's criticism of the concept of disease as a morbid entity and his argument for the physiological notion. I explore the historical background of Allbutt's view and explain how he used history to support his claims. Chapter five is devoted to Allbutt's advocacy of comparative pathology. I explain Allbutt's criticism of what he called 'anthropocentric medicine' and discuss how he integrated medicine and biology with an evolutionist framing of comparative pathology.

Through my discussion, Allbutt's achievements can be understood in a new light and I also aim to complement the received image of scientific medicine with a more biologically focused character.

Table of Contents

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Chapter One

Introduction: Clifford Allbutt as a Critic and Reformer of Nineteenth-Century English Medicine

1 Why an intellectual biography for Clifford Allbutt?

Clifford Allbutt (1836-1925) is an unjustly neglected figure. Although historians of medicine do recognize Allbutt as an influential figure in late nineteenth-century English medicine, that is usually for the positions he held: Commissioner of Lunacy (1889-1892), Regius Professor of Physic at Cambridge University (1892-1925), a member of the Medical Research Committee (1913-1916), President of the British Medical Association (1915-1920) and a medical historian etc. In this thesis, I argue that Allbutt's major achievements were, rather, intellectual, including his physiological and biological thinking in medicine, his advocacy of clinical research, of the unification of physic and the basic sciences, of the physiological concept of disease, and of comparative pathology. My work will show the kind of insights that can be gained through more attention to the intellectual reforms that created 'scientific' medicine in English medicine, in which Allbutt was a leading figure.

Allbutt's medical thinking cannot be explained in a few words. However, a brief look at the following selection of appraisals will indicate the versatility and distinctiveness of his ideas. According to Allbutt's biographer, Humphry Davy Rolleston, Lieut. – Colonel Fielding Hudson Garrison remarked in 1925:

> They [Allbutt's articles] are Zukunftsmusik[1] of an aspiration so exalted as to be, in mathematical phrase, asymptotic; wonderful visions into the

[1] Zukunftsmusik is a German idiomatic expression, meaning 'dreams or ideals for the future'.

> medicine of the future which it will require post-bellum medicine (visibly 'limping across the state line') many decades to realize.[2]

In a letter to Allbutt after George Henry Lewes' death, George Eliot invited Allbutt to write a brief sketch of Lewes' mental and moral qualities. In the letter, Eliot described Allbutt as a 'scientific experimenter':

> I am tempted to ask you whether it would be otherwise than repugnant to you – whether you would have any satisfaction in writing, not a eulogistic, but a plain statement of your observation and experience in relation to the effect of my husband's work, to be printed in quotation, but not (unless you wished it) with your name, simply as a testimony of an experienced physician whose judgment is not simply that of a professional man, but of a *scientific experimenter.*[3] (my italics)

In a comparison of Osler and Allbutt's historical work, i.e. Osler's *The Evolution of Medicine* and Allbutt's *Greek Medicine in Rome: the Fitzpatrick Lectures on the History of Medicine Delivered at the Royal College of Physicians of London in 1909-1910, with Other Historical Essays*, Major Greenwood, an English epidemiologist, medical statistician and medical biographer, argued that Allbutt was a more sophisticated historian:[4]

> Osler never wrote anything at that level. Allbutt did try to discover what *really* interested not himself but his predecessors. He did not gaily

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[2] Garrison was Lecturer in the history of medicine and Librarian of the Welch Medical Library. He was also a staff member of the Army Medical Library; the author of *Introduction to the History of Medicine*; and the co-editor with Leslie Thomas Morton of *A Medical Bibliography*. The articles that Garrison referred to included 'The Significance of Skin Affections in the Classification of Disease'(1867), 'On the Classification of Diseases by Means of Comparative Nosology' (1888), and 'Words and Things' (1906). This quote is originally in *Science*, N. Y., 1925, lxi: 330. Cited in Humphry Davy Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, London, Macmillan and Co. Limited, 1929, p. 17.

[3] George Eliot, 'GE to Thomas Clifford Allbutt: London, 20 February 1879', in Gordon S. Haight (ed), *The George Lewes Letters*, 9 vols, London, Oxford University Press, 1956, vol. 7, p. 103.

[4] Osler's *The Evolution of Medicine* (New Haven, 1921) was a collection of his lectures for the Silliman Foundation, published shortly after his death.

> dismiss *their* philosophies. Ancient pneumatism is not a doctrine sympathetic to a Fellow of the Royal Society in the late nineteenth century; but Allbutt took great pains to ascertain what the pneumatists were at; he had an adult mind.[5]

Greenwood went on:

> Adult medical history is a disentanglement of interpretations; it involves the immensely difficult task of ascertaining how far a conclusion can really be said to have been drawn from the evidence the reasoner *believed* to be its justification and how far he was influenced by something not stated; not stated because, to the reasoner, it was obvious; while to us it is mysterious and must be explained...Osler left some charming essays, such as that on Bassett (*The Alabama Student*). In the sense in which Allbutt was a historian, he [Osler] was not a historian at all but an agreeable guide to the "sights" of antiquity.[6]

All this suggests that Allbutt deserves more attention and a closer examination.

Allbutt's medical thinking was crystallized in the late nineteenth century, a period in which historians of medicine have identified a profound change in English medicine. The age, it is said, marks the beginning of scientific medicine in England and is also the period in which cellular pathology, antiseptic surgery, bacteriology, Darwinian evolution, various kinds of instrument and the experimental method etc. were accepted or introduced into English medicine. Allbutt witnessed all this and he was actually involved in the advocacy of some of these innovations. Modern studies of the history of late nineteenth-century English medicine are not very extensive and many of them are socially or institutionally oriented. For example, in *Gentlemen,*

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[5] Major Greenwood, *The Medical Dictator and Other Biographical Studies*, London, Williams and Norgate Ltd, 1936, pp. 163-164.
[6] Ibid., pp. 164-165.

Scientists and Doctors: Medicine at Cambridge, 1800-1900, Mark W. Weatherall examined the making of the modern medical curriculum at Cambridge University, with reference to the historical relations of science and medicine, on doctors and scientists, their contests, alliances and disagreements.[7] In John Pickstone's edited volume, *Medical Innovations in Historical Perspective*, several features in late-nineteenth-and-early-twentieth-century medicine, such as sanatoria, diphtheria anti-toxin, vaccine therapy, x-ray etc., were examined in relation to social, economic, political and institutional backgrounds.[8] The discussions emphasized the contingent and socially-constructed characters of these innovations. Similar studies also include, for instance, Andrew Cunningham and Perry Williams' edited volume, *The Laboratory Revolution in Medicine*. Basing their discussions on the rise of laboratory medicine, the authors emphasized the complicated negotiations in institutionalizing medical laboratories; how the public was convinced of the authority of the laboratory; the antivivisection movement in Britain; the construction of medical knowledge; and the commercial value of laboratory research, etc. They also questioned what they saw as the triumphal characterization of laboratory medicine, and argued that such an optimism was something to be explained rather than to be assumed.[9] Elsbeth Heaman's recent work on the history of St Mary's Hospital Medical School was focused on the social context in which the hospital was founded; the changes in medical teaching and practice brought by the advent of scientific research at the turn of the century; the influence of the state's intervention upon the making of medical knowledge; the institutionalization of science at various departments of the hospital;

[7] Mark W. Weatherall, *Gentlemen, Scientists, and Doctors: Medicine at Cambridge, 1800-1940*, Woodbridge, Rochester and New York, Boydell Press in association with Cambridge University, 2000.

[8] John V. Pickstone (ed), *Medical Innovations in Historical Perspective*, Houndmills, Basingstoke and London, Macmillan Academic and Professional Ltd, 1992.

[9] Andrew Cunningham and Perry Williams (eds), *The Laboratory Revolution in Medicine*, Cambridge and New York, Cambridge University Press, 1992.

and the social and political consequences of 'scientization' at the hospital.[10] Another example is Keir Waddington's recent work on St. Bartholomew's Hospital, in which the author focused on the nature of institutional medical education, the use of science in medicine, curriculum reform and the development of research culture.[11] With regard to the study of measurement and instrumentation, M. Norton Wise's edited volume, *The Value of Precision*, is also socially oriented. In this book, various authors discussed how the value of precision was socially constructed; how precision was tied with other social values, such as justice, trust and unity; and the various meanings of precision in science, medicine, commerce and industry.[12] As for the study of the social image of medical practitioners, Christopher Lawrence has examined English elite physicians' reaction to the crisis of their professional identity created by the scientific procedures of diagnosis and therapy.[13]

In contrast, the present work is an intellectual biography. It also differs from traditional biographies in that the latter are often career-based and emphasize what historical actors *do* in a particular field. For instance, in recent biographies of late nineteenth-century medical figures, such as Michael Bliss' account of William Osler and Terrie M. Romano's of John Burdon-Sanderson, both authors emphasized what Osler and Burdson-Sanderson had done to make medicine more scientific.[14] The

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[10] Elsbeth Heaman, *St. Mary's: the History of a London Teaching Hospital*, Montreal, McGill – Queen's University Press, 2003.
[11] Keir Waddington, *Medical Education at St Bartholomew's Hospital 1123-1995*, Woodbridge, Suffolk, Rochester and New York, The Boydell Press, 2003.
[12] M. Norton Wise (ed), *The Value of Precision*, Princeton (New Jersey), Princeton University Press, 1995.
[13] Christopher Lawrence, 'Incommunicable Knowledge: Science, Technology and the Clinical Art in Britain 1850-1914', *Journal of Contemporary History*, SAGE, London, Beverly Hills and New Delhi, 1985, xx: 502-520; and Christopher Lawrence, 'Moderns and Ancients: the "New Cardiology" in Britain 1880-1930' in William F. Bynum, Christopher Lawrence and Vivian Nutton (eds), *The Emergence of Modern Cardiology*, (*Medical History*, Supplement no. 5), London, Wellcome Institute for the History of Medicine, 1985, pp. 1-33.
[14] Michael Bliss, *William Osler: A Life in Medicine*, Oxford, Oxford University Press, 1999; Terrie M. Romano, *Making Medicine Scientific: John Burdon Sanderson and the Culture of Victorian Science*, Baltimore and London, The Johns Hopkins University Press, 2002.

major difference in these two accounts is only a matter of presentation: while Bliss classified Osler's life and career into several stages and reviewed them chronologically, Romano divided Burdon-Sanderson's endeavours into clinical medicine, public health, experimental physiology and pathology, comparative anatomy and microscopic investigations, under the overall theme of making medicine scientific. The present work, in contrast, emphasizes what the historical actor *thinks*. Allbutt was a man full of insights and critical power. He had his own comprehensive medical philosophy. Hence, although there are already some traditional biographies of Allbutt, written by Humphry Davy Rolleston, Burton Chance and Lord Cohen respectively, I think that the Regius Professor also deserves an intellectual study.[15] Whereas Rolleston, Chance and Cohen introduced Allbutt as a medical historian and a versatile doctor knowledgeable about medicine, surgery, neurology and cardiology, I analyse how these aspects were intellectually tied with one another and how Allbutt attempted to re-think medical theory and practice from an intellectual point of view. For instance, I examine in detail how Allbutt attempted to reform English clinical medicine with the use of the ophthalmoscope and the thermometer for research purposes. I also discuss how Allbutt justified comparative pathology by appealing to the idea of evolution and the success of nineteenth-century biological sciences. This kind of study requires a detailed textual analysis of Allbutt's writing. Hence, in the present work, I discuss, to a large extent, Allbutt's addresses, research papers and historical writing. This non-career-based approach, I think, can provide a new angle to see Allbutt as a medical thinker and to reconceptualize his influence upon late

[15] For Allbutt's biographies, see Humphry Davy Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, London, Macmillan and Co. Limited, 1929; Burton Chance, 'Sir Clifford Allbutt, The Apostle of Medical Ophthalmoscopy', *Archives of Ophthalmology*, 1937, xvii (no. 5): 819-858; Lord Cohen of Birkenhead, 'The Rt. Hon. Sir Thomas Clifford Allbutt, F.R.S. (1836-1925)', in Arthur Rook (ed), *Cambridge and its Contribution to Medicine: Proceedings of the Seventh British Congress on the History of Medicine University of Cambridge, 10-13 September, 1969*, London, Wellcome Institute of the History of Medicine, 1971, pp. 173-192.

nineteenth-century English medicine in a way that the newer, socially oriented historiography does not do.

Allbutt's writings can be divided into four categories: (1) addresses, (2) research papers, (3) historical papers and (4) correspondence. Not all of Allbutt's research papers published in journals expressed his medical philosophy. Some of them were simply technical discussions of diagnosis and therapeutics of particular diseases. These papers had little intellectual import and therefore they are excluded from my analysis. Allbutt's medical philosophy, rather, was prominent in his addresses. To Allbutt's unpublished papers there will be little reference in this thesis. This is because, as Rolleston remarked, Allbutt "kept very few letters, did not write a diary, or leave any unpublished reminiscences".[16] Some of Allbutt's correspondences, such as his letters to Lord Acton and Oscar Browning, can now be found at Oxford, Cambridge, The Royal College of Physicians, the British Library and the Wellcome Library (London). However, most of them are non-informative post cards or letters about personal matters, such as invitations to operas, which are unimportant to Allbutt's medical ideas or his medical teaching and practice. Therefore, they are regarded as unsuitable research material for the purpose of the present work. More disappointing, those I regard as important intellectual associates of Allbutt, such as John Hughlings Jackson, George Henry Lewes and Michael Foster, left no correspondence with Allbutt. Printed papers, therefore, become the main source for this work.

As a result, the present work is largely based on (1) Allbutt's addresses, such as 'Progress of the Art of Medicine' (1870), 'On the Surgical Aids to Medicine' (1882), 'On the Classification of Diseases by Means of Comparative Nosology' (1888), 'The

[16] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, 'Preface'.

Historical Relations between Surgery and Medicine' (1904), 'Words and Things' (1906), 'The New Birth of Medicine' (1919), 'The Integration of Medicine' (1923) and others; (2) Allbutt's research, such as 'Medical Thermometry' (1870) and his monograph *On the Use of the Ophthmoscope*, which I shall argue was his tool for reforming contemporary clinical medicine to become an on-going research enterprise; and (3) *Greek Medicine and Rome*, which contains several Allbutt's important historical papers showing how he used history to support his medical reforms, such as his advocacy of a physiological concept of disease and the integration of medicine and surgery. In addition, Allbutt's biography and the social and intellectual background of his time will be occasionally referred to in my discussion in order to provide a more comprehensive picture of this historical actor.

Before entering into the details of Allbutt's work, I must make a brief defence of my intellectual-history approach, against those who might demand a more sociological approach. In 'History of Science and its Sociological Reconstructions', Steven Shapin argued for the sociological approach to the history of science. According to Shapin, since scientific observations are theory-laden and scientists holding opposing theories often disagree about what relevant evidence is, crucial experiments are often impossible and consequently "neither reality nor logic nor impersonal criteria of 'the experimental method' dictates the accounts that scientists produce or the judgments they make".[17] In this situation, theory-choice is often determined by social factors, such as professional vested interests within the scientific community and concerns of social groups in the wider society. Sociologists of science, Shapin argued, have repeatedly demonstrated how these interests and

[17] Steven Shapin, 'History of Science and its Sociological Reconstructions', *History of Science*, 1982, xx: 164.

concerns play an important role in the production of knowledge.[18] Shapin further argued for an 'instrumental model' of knowledge which sees the generation and evaluation of knowledge as goal-directed (these goals are supposed to be non-scientific).[19] Such a model was widely adopted and continued by social historians and sociologists of science. For instance, in their recent paper, Steve Sturdy and Roger Cooter argued that laboratory science was adopted in medicine in the late nineteenth and early twentieth century because its ability to produce objective and quantified diagnostic results, its standardized therapeutic method, and its division of labour in investigations of disease were seen as an effective means of promoting administrative efficiency within the emerging system of corporate health care.[20] This promotion, Sturdy and Cooter added, was one of the manifestations of a wider management culture in business, industry and government of the time.

Shapin's instrumental model, however, is defective. First, it assumes that satisfactory explanations of scientific development must appeal to non-scientific goals and this consequently downplays the importance of intellectual history. Although social historians or sociologists of science have presented some convincing examples showing that the positivist-realist model does not accurately describe scientific development, this does not render their position universally valid. Even though observations are theory-laden, theory-choice is not necessarily and might not be fully determined by social and professional interests. A significant role may also be played by Intellectual interests and values advocated for the sake of science itself, such as ontological simplicity and the value of experimentation. Sociologically inclined historians very often do not see the possibility of the self-sufficiency of

[18] Ibid.
[19] Ibid., p. 197.
[20] Steve Sturdy and Roger Cooter, 'Science, Scientific Management, and the Transformation of Medicine in Britain 1870-1950', *History of Science*, 1998, xxxvi: 421-466.

scientific discourse. In their view, science must be justified by non-science. However, this is to overlook the fact that being 'scientific' is in itself valuable to scientists. It perfectly makes sense that scientists support a particular theory because they think that the theory is more scientific and being more scientific is a good thing in itself. Social historians might argue that the criteria of scientificity are contingent but contingency does not remove the self-sufficient value of scientificity. It only shows that the criteria are revisable. The revisions are not necessarily and entirely caused by social and political interests. They can be made for the sake of a better science. Claude Bernard's advocacy of the use of the experimental method in medicine in place of morbid-anatomy is a good example. In addition, to show this contingent character, we need intellectual history. One should not forget that Thomas Kuhn's *The Structure of Scientific Revolutions*, which exposed the contingent character of the criteria of scientificity and laid down the foundation for sociology of science that Barry Barnes, David Bloor, Shapin and others further developed, was itself intellectual history.[21]

It is evident that intellectual historians have made substantial contributions to the understanding of scientific development. Prior to Kuhn, Gaston Bachelard had argued in *The New Scientific Spirit* that there was an epistemological break between Newtonian physics and Einsteinian physics.[22] While in Newtonian physics substance (matter) was regarded as the fundamental existence of the universe, in Einsteinian physics the fundamental existence was mathematical relations. Bachelard argued that to abandon the Newtonian worldview and to adopt the Einsteinian one was a radical and progressive change. Apart from physics, intellectual studies in the history of

[21] Thomas S. Kuhn, *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1970.
[22] Gaston Bachelard, *The New Scientific Spirit*, transl. Arthur Goldhammer, Boston, Beacon Press, 1984.

medicine were also remarkable. In *The Normal and the Pathological*, Georges Canguilhem's criticism of the application of quantification to the concept of disease is largely based on his study of the intellectual history of nineteenth-century medicine.[23] Gary Gutting has argued that Bachelard and Canguilhem's work strongly influenced Michel Foucault.[24] Other exemplars of intellectual medical history include, for instance, Knud Faber's *Nosology: the Evolution of Clinical Medicine in Modern Times*. In this work, Faber presented an intellectual history of the concept of disease and its classificatory methods in relation to Thomas Sydenham, Paris medicine, German physiological medicine, bacteriology, functional diagnosis and constitutional pathology.[25] He demonstrated how historically the nosography based on bedside observation was enriched by the introduction of morbid anatomy, physiological experiment, bacteriological research and various pathological theories. In regard of the material culture in medicine, Stanley Joel Reiser's *Medicine and the Reign of Technology* is also widely regarded as important.[26] In this book, Reiser charted the development of diagnostic instruments and technology in the nineteenth and early twentieth century and argued that, in modern medicine, diagnostic judgments based on reproducible, standardized, numerical or graphical data produced by instruments and diagnostic machines replaced the earlier ones based on the patient's and the physician's subjective experience. He also suggested how the doctor-patient relationship changed accordingly. All this indicates that intellectual history has a distinct contribution to make. In fact, both the intellectual and the social aspect of the

[23] Georges Canguilhem, *The Normal and the Pathological*, transl. Carolyn R. Fawcett and Robert S. Cohen, New York, Zone books, 1989.
[24] Gary Gutting, *Michel Foucault's Archaeology of Scientific Reason*, Cambridge, Cambridge University Press, 1989, ch. 1.
[25] Knud Faber, *Nosography: the Evolution of Clinical Medicine in Modern Times*, New York, Paul B. Hoeber, 1978.
[26] Stanley Joel Reiser, *Medicine and the Reign of Technology*, Cambridge, London, New York and Melbourne, Cambridge University Press, 1978.

history of science (including medicine) are equally important. A monopoly by either side would only be an indication of scholarly absolutism.

Recently, some scholars have sounded an alarm the over-dominance of social history and the use of the sociological approach. For instance, in his paper 'The History of Science and Sciences of Medicine', John Harley Warner remarked:

> Drawing attention to the importance of neglected topics [on the instrumental and ideological role of medical sciences] has tended to privilege them, and not only to deprivilege but to delegitimize the study of longer-established themes that are equally critical to our understanding of the medical past: the ideas of medical elites, the technical content of medical knowledge and practice, and the dynamics of conceptual change in the biochemical sciences.[27]

Warner's worry is realistic. As noted, recent accounts on the development of nineteenth-century medicine are largely socially-oriented. This indicates a concerted effort to reconstruct nineteenth-century medicine in a socially-oriented framework. While such an effort is valuable, its dominance to the exclusion of intellectual history might lead public readers to think that the production of medical knowledge is mainly to serve social and political goals.

The problem of the dichotomy between intellectual history and social history has been considered by various historians from different angles. Bruno Latour has convincingly criticized the framework of the 'naturalistic explanation' adopted by the Edinburgh School.[28] The distinction between non-social nature and social nature, separated by 'the wedge', each of which possesses its own type of causality, Latour argued, is simply unrealistic. Such a framework also limits historians' vision,

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[27] John Harley Warner, 'The History of Science and Sciences of Medicine', *Osiris*, 1995, x: 173.
[28] Bruno Latour, 'For David Bloor...and Beyond: A Reply to David Bloor's "Anti-Latour"', *Studies in History and Philosophy of Science*, 1999, xxx, no. 1: 113-129.

preventing them from seeing the differentiated nature of particular case studies. Warner also examined the issue with reference to the historiographical development in the history of science. He noted that in this development there exists a dichotomy between intellectual and social history. This dichotomy, he argued, will lead to 'historical reductionism' which is a baneful phenomenon:[29]

> What should be heartening, however, is a mounting call in recent years to *shun reductionism* and embrace complexity – to recognize that no single perspective on science in medicine will even begin to exhaust historical understanding. (my italics)[30]

Of course, historians are free to tailor their accounts to be intellectually-inclined or socially-inclined or both according to their needs. The important point, in Warner's view, is that the historians should be aware of their limits, seeing themselves as those "looking either at one aspect or at another of a more complex issue".[31] In the light of this, Shapin's argument for the sociology of science and medicine fosters a kind of reductionism that Warner decried. Shapin aimed to reduce the history of medicine to sociology of medicine and medical knowledge to instruments serving professional and social interests. This historiography would bury the intellectual aspect of the development of medicine.

Aware of the unnecessary and unproductive dichotomy between intellectual and social history, some historians have adopted an integrative approach. Historiographically integrative accounts for nineteenth-century English medicine include, for instance, Willliam F. Bynum's *Science and the Practice of Medicine in the Nineteenth Century*, in which the author provided an all-round discussion which

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[29] Warner, 'The History of Science and Sciences of Medicine', p. 174.
[30] Ibid.
[31] Ibid., p. 177.

covers the changes of ideas, cognition, institutional and professional structures in medicine throughout the whole century in Europe and America.[32] Michael Worboys' recent work, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865-1900*, is also exemplary. Treating the intellectual and the social-institutional perspectives equally, Worboys discussed the complexity and controversies of the use of germ theories and germ practices in English medical cultures, such as veterinary medicine, public health, surgery, internal medicine and pathology.[33] It should be noted that accounts such as Bynum's and Worboys' are usually general and they provide readers with an overview of the medical development. However, these generalistic accounts have their limitations: they lack the details.

In contrast, my account is particularistic. I aim to supply the details of Allbutt's medical thought because, as I said, Allbutt is a significant historical actor and such literature is very small for English medicine. The particularistic approach has another advantage, which is to provide counter-examples against certain general claims and show that those claims are invalid. For example, based on my study of Allbutt's reform of clinical medicine in chapter two, I argue that Nicholas D. Jewson's historiography that Western medicine is sharply divided into three successive stages, i.e. bedside, hospital and laboratory medicines, is an inaccurate description (at least) for the development of English medicine. My case study rather supports John Pickstone's view that Jewson's *stages* should be seen as *types* for which crossing-over is possible.[34]

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[32] William F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century*, Cambridge, Cambridge University Press, 1994.
[33] By 'germ practices', Worboys refers to "seeing, killing, culturing, altering and representing germs". (See Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865-1900*, Cambridge, Cambridge University Press, 2000, p. 5.)
[34] See John Pickstone, 'The Biographical and the Analytical towards a Historical Model of Science and Practice in Modern Medicine', *Medicine and Change: Historical and Sociological Studies of Medical Innovation*, Ilana Löwy (ed), Montrouge, France, John Libbey Eurotext, 1993, pp. 23-47.

2 Allbutt's criticisms and reforms

In this thesis, I argue that Allbutt was a critic and reformer of late nineteenth century English medicine. Throughout his career, he persistently criticized English medicine of his time for being unscientific. It should be noted that Allbutt's reform was intellectual. He was not an experimenter like Michael Foster, nor was he a powerful administrator or philanthropist. He criticized English medicine and argued for his own views in his writing. His criticism can be divided into three aspects: (1) the empiricist and routine character of contemporary English clinical medicine; (2) the use of loose medical language–describing diseases as morbid entities; and (3) the anthropocentric character of pathology. Corresponding to each aspect, Allbutt introduced as remedies (i) clinical research and the integration of medicine, surgery and the basic sciences; (ii) the physiological concept of disease; and (iii) comparative pathology as a step to making medicine a biological science. All this will be discussed in detail in the following chapters, but I will give a brief overview of those themes here.

Much of Allbutt's medical thought was crystallized in his early days (late 1860s to early 1870s) and remained the same throughout his career. For instance, his criticism of 'empiricist' medicine began early in his career. In *On the Use of the Ophthalmoscope* published in 1871, he criticized the use of the 'case-taking method' in contemporary clinical medicine for lacking the spirit of research (I will discuss this criticism in detail in chapter two). This view was maintained in his address 'The New Birth of Medicine' delivered in 1919. In the address, he complained that "in neglect of research into truth below the surface, [English] Medicine, for lack of a deeper anchorage, has always sunk back into empiricism and routine".[35] Medicine in the early twentieth-century London, according to him, was like a factory and Harley Street was the grave of clinical research.[36] London physicians, he said, merely 'practised' medicine and 'dealt with' patients. They might have rich experience in treating patients, but they were not good at experimental research and explanation. This atmosphere deprived medical graduates of scientific wisdom. Allbutt claimed that medical graduates would lose the habit of scientific research after practising in London:

> But when my pupils leave Cambridge for London, imbued I hope with some scientific ideas, and somewhat enlarged in scientific imagination, they begin there to lose much of this outlook, much of these ideas. Fascinated, as just they are, by the practical wisdom, sagacity, ripe experience and clever resources of their medical and surgical teachers – for as practitioners, I repeat, these are the best of the world – the pupil loses vision of Medicine as a science.[37]

While English clinical medicine emphasized skill, sagacity and empirical knowledge, Allbutt held that all this was a barrier to a scientific medicine, which required an investigative spirit and the use of the experimental method.[38]

Allbutt's objection to the division between physic and surgery also began in 1860s, during which he learned surgical skills under Armand Trousseau in France and later worked closely with Thomas Pridgin Teale at Leeds. In 'On "Optic Neuritis" as a Symptom of Disease of the Brain and Spinal Cord', published in 1868, he remarked:

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[35] Clifford Allbutt, 'The New Birth of Medicine', *The British Medical Journal*, 1919, i: 434.
[36] Ibid.
[37] Ibid.
[38] Ibid.

> Two hundred years ago, when knowledge was less, divisions which, on the ground of human incapacity, were unnecessary, were then observed for reasons of caste. The Surgeon, in that degraded time of the Profession, was distinct from the Physician as a craftsman from the professor of a liberal art... Our present fault is not that we still recognize some partition of the realm of Medicine, but that we still hold to certain artificial boundaries with a rigidity quite opposed to the easy and natural arrangements of modern science. Our present unnatural separation of what we call "Surgery" from that which we call "Medicine" is greatly retarding our progress, not only as scientific observers, but also as Practitioners. [39]

In 'On the Use of the Ophthalmoscope', Allbutt made a similar complaint about the divorce between the physician and the ophthalmic surgeon.[40] Such a protest also appeared in 'On the Surgical Aids to Medicine' published in 1882 and 'The Historical Relations of Medicine and Surgery', published in 1904. All this indicates that the integration of medicine and surgery was Allbutt's life-long pursuit.

Allbutt's advocacy of the physiological concept of disease also began early, starting with 'Progress of the Art of Medicine' published in 1870. Twenty-six years later, his view remained unchanged. In his 'Introduction' to *A System of Medicine*, an eight-volume work published from 1896 to 1899, first edited by himself and then jointly with Rolleston in later editions, he noted that to regard disease as a morbid entity was to personify disease and this was a misuse of figurative language.[41] His

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[39] Clifford Allbutt, 'On "Optic Neuritis" as a Symptom of Disease of the Brain and Spinal Cord', *Medical Times and Gazette*, 1868, i: 495-496.

[40] Clifford Allbutt, *On the Use of the Ophthalmoscope in Diseases of the Nervous System and of The Kidneys; also in Certain Other General Disorders*, London, Macmillan, 1871, p. 8.

[41] Clifford Allbutt 'Introduction', in Clifford Allbutt (ed), *A System of Medicine*, 1st ed., 8 vols, London, Macmillan and Co., Limited, 1896, vol. 1, xxii.

addresses published in the early twentieth century also proved his tenacity of this view. For instance, in 'Words and Things', delivered in 1906, he maintained that disease was not a thing and that 'entity' was a bad word to describe disease.[42] In 1919, thirteen years after the publication of 'Words and Things', Allbutt criticized the morbid entity view again in 'Medicine and the People: A Review of Some Latter-Day Tracts'.

Allbutt's first argument for the importance of comparative pathology was made in 'Classification of Disease' published in 1869. Nineteenth years later, he discussed the issue again in more details in 'On the Classification of Diseases by Means of Comparative Nosology'. The importance of comparative pathology in human medicine was not widely recognized in England until 1920s and this recognition must be largely attributed to Allbutt, who took up the first Presidency to the Section of Comparative Medicine of the Royal Society of Medicine in 1923. In his Presidential Address 'The Integration of Medicine', Allbutt noted that it was a long battle for making the subject recognized in human medicine:

> If for years slowly and almost silently our work makes its way we must be content; our experience of the world teaches us to be content; but happily, now and then, after long hewing in the dark forest, we break into the light; we find ourselves almost suddenly upon a peak, our way open and bright before us, and our cause justified before men.[43]

All this cumulates the message that Allbutt was a resolved reformer of English medicine. His medical thought was consistent throughout his career, with a few minor expansions, such as the increasing emphasis of the relation between medicine and biology. In short, one thing is certain: Allbutt's medical thought was crystallized

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[42] Clifford Allbutt, 'Words and Things', *The Lancet*, 1906, ii: 1122.
[43] Clifford Allbutt, 'The Integration of Medicine', *The Proceedings of the Royal Society of Medicine*, 1923, Section of Medicine, p. 1.

around 1870. Therefore, a biographical discussion of his education and early career is definitely crucial to explaining the formation of his views. In the next section, I discuss Allbutt's educational background, early career and early associates. Specific discussions of his career with reference to particular criticisms of English medicine will be included in subsequent chapters.

3 Allbutt's broad-minded character in medicine

Born as a son of a parson, Reverend Thomas Allbutt, at Dewsbury in Yorkshire, Young Allbutt had close contact with five medical uncles. As a small boy, he was "allowed free access to the old-fashioned surgeries of the two medical uncles in the neighbourhood" and became familiar with various surgical instruments and *The Lancet*.[44] After graduating from St. Peter School, York in 1855, Allbutt entered Gonville and Caius College, Cambridge. He first gained a Caian Scholarship in classics but eventually he decided to study science. At Cambridge, he received good training in the experimental method and was particularly good at chemistry and geology. In 1859, he was awarded a Mickleburgh Scholarship in chemistry and when he got a Middle Bachelor at the Natural Sciences Tripos he was the only one in the first class gaining distinctions in chemistry and geology.[45] This shows that he had a strong background in the basic sciences.

In 1858, Allbutt entered the Medical School of St. George's Hospital, London.[46] It is an interesting question why Allbutt, as a product of St. George's, would criticize for the rest of his life the clinical culture of the 'Greats' for being routine, empiricist, and unscientific. There are several factors contributing to Allbutt's standpoint. As noted, Allbutt was good at chemistry. At St. George's his interest in this subject was

[44] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 7.
[45] Ibid., p. 9-10.
[46] Ibid., p. 12.

reinforced by the teaching of Henry Bence Jones, who had studied chemistry under Liebig at Giessen.[47] In his teaching, Bence Jones "preached the gospel of chemistry *in partibus infidelium*, in company with W. Prout and Golding Bird."[48] Bence Jones was also involved in the discovery of urinary protein in multiple myeloma. The protein was then named 'the Bence Jones protein'.[49] It is likely that Bence Jones' teaching confirmed Allbutt's appreciation of explanation, experimentation and scientific analysis in medicine, as opposed to the emphasis of clinical skills and case history in the London clinical culture.

At St. George's, Allbutt was also a colleague of John William Ogle, who was keen on the study of pathology and nervous diseases. Ogle was one of the first to use the ophthalmoscope in English medicine. His "interest in the application of the ophthalmoscope to medicine," Rolleston said, "must have attracted Allbutt to this subject, though the compelling suggestion admittedly came from Hughlings Jackson", who also became Allbutt's life-long associate in ophthalmic research.[50]

Allbutt's one-year-study in France also contributed to the formation of his broad-minded character in medicine. Allbutt obtained his M.B. degree at Cambridge in 1861. Before proceeding to the degree of M. D. that he obtained in 1869, he followed Bence Jones' advice to take a post-graduate course in Paris for a year. Such a continental tour was common practice for English medical graduates in the nineteenth century who could afford it. In Paris, Allbutt had opportunities to attend several clinics, including 'Hôtel Dieu', of Armand Trousseau. Trousseau had been appointed to the Chair of Therapeutics in the École de Medicine in Paris and was a popular teacher in the 1860s. Allbutt learnt from Trousseau various surgical

[47] Jacob Rosenbloom, 'An Appreciation of Henry Bence Jones', *Annals of Medical History*, 1919, ii: 262.
[48] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 13.
[49] Rosenbloom, 'An Appreciation of Henry Bence Jones', p. 264.
[50] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 13.

techniques, including "a much-needed example in draining pleuritic and pericarditic effusions, for in those far-off days blistering, not tapping, was in vogue, and it was not uncommon to see an empyema pointing".[51] This, Rolleston claims, led Allbutt "first to practise and then to preach the doctrine of draining and opening the pericardium". [52] Trousseau's teaching certainly made Allbutt recognize the importance of applying surgical skills to diagnosis and therapeutics and planted the seeds of Allbutt's life-long protest against the divorce of medicine and surgery.

Trousseau also introduced Allbutt to the well-known French neurologist Guillaume Benjamin Amand Duchenne. Duchenne encouraged Allbutt to visit his clinic in the Boulevard des Capucins and aroused Allbutt's interest in nervous diseases.[53] In later years, Allbutt, George Henry Lewes, John Hughlings Jackson, Thomas Buzzard and William Tennant Gairdner formed an informed group 'a gang of neurologists'. They maintained a good connection with Duchenne.[54]

It is important to note that in his Cambridge days Allbutt read widely and was impressed by August Comte's positive philosophy. As Rolleston remarks, an "almost accidental reading of August Comte's *Philosophie positive* transformed his [Allbutt's] outlook and determined his future life by turning his thoughts to

[51] Ibid., p. 14.
[52] Ibid.
[53] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, pp. 15-16.
[54] Rolleston recorded the following episode: in one of their meetings, the gang of neurologists invited Duchenne to visit London to give them a neurological demonstration. However, that visit was a poor experience for Duchenne. As Allbutt recollected, "Duchenne started from home with a portmanteau which may have contained a few small pieces of raiment, but chiefly a collection of diseased bones from certain of his necropsies. This baggage, after his manner *en route*, Duchenne managed to lose, and he arrived in London in much agitation, as well he might seeing the nature of its contents; and he became almost frantic when we failed to make light of the peril that he saw before him. We pictured the hubbub which would arise on the inevitable official examination of the portmanteau, for it so happened that about that time human remains, supposed to be those of a murdered man, had been found in a carpet-bag dropped into some dark pool of the Thames. Dear little man; it was wicked to tease him, but he was so childlike, so guileless, and so fiery. Happily ere long the portmanteau was restored to its owner intact, and the bones had to tell a different story from that which its anxious owner had imagined." (Ibid., p. 16.)

science."[55] According to Comte, there were three stages in the history of ideas: the first was the theological, in which the will of some deity was used to explain all kinds of problems; the second stage was the metaphysical, in which abstractions were conceived to explain natural phenomena; the third was positive science, in which natural phenomena were investigated by the use of observation, hypothesis and experiment.[56] Comte's model, as I argue in chapter four, was consistent with Allbutt's criticism of the concept of disease as morbid entity and his advocacy of the physiological view of disease.

The Leeds period was also crucial to the crystallization of Allbutt's medical thought. Allbutt began practising at Leeds in 1861. Yorkshire provided favourable conditions for Allbutt's later achievements. First, The Leeds House of Recovery, in which Allbutt practised in his early days, was one of the early 'fever hospitals' in England.[57] This made Allbutt appreciate the importance of clinical thermometry and stimulated him to design the 3-inch clinical thermometer in 1867. Second, York had been a centre for the medical care of the insane since the eighteenth century.[58] Since the insane usually had nervous problems, the medical environment of York was therefore conducive to ophthalmology. It was also the place where Allbutt and John Hughlings Jackson started their friendship. Ophthalmology, as will be discussed in chapter two, was crucial to the cultivation of the spirit of research in clinical medicine, as Allbutt conceived it. Allbutt's experience in ophthalmic research into nervous disease in the 1860s enabled him to write *On the Use of the Ophthalmoscope* which was published in 1871. Third, Leeds was well-known for surgery (more than

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[55] Ibid., p. 12.
[56] Lord Cohen of Birkenhead, 'The Rt. Hon. Sir Thomas Clifford Allbutt', p. 174.
[57] Chance, 'Sir Clifford Allbutt', p. 823.
[58] Samuel H. Greenblatt, 'The Major Influences on the Early Life and Work of John Hughlings Jackson', *Bulletin of the History of Medicine*, 1965, xxxix: 351.

internal medicine).[59] In 1864, Allbutt was appointed Physician to the Leeds General Infirmary. There he worked closely with a surgeon, Thomas Pridgin Teale. In Lord Moynihan's tribute to Allbutt, Teale and Allbutt were described as having formed "the first alliance [of physician and surgeon] known to me [Moynihan] in this country" and were "pioneers of 'team work'".[60] Their co-operation lasted for years and it certainly confirmed Allbutt's conviction that medicine and surgery should be integrated. In 1886, Allbutt published a case in which a patient had pericarditis with an effusion, which caused serious distress and was almost fatal. At his request, his colleague Claudius Galen Wheelhouse performed paracentesis of the pericardium and the patient's life was saved.[61] On this case Allbutt remarked:

> .....this case showed how necessary it is for a physician to have a useful knowledge of the resources of the surgeon, and that nothing was more unfortunate than this division between the two great departments of the healing art, whereby a mere arrangement of convenience had been made a real distinction, thus encouraging at the very outset of a student's career a narrowness of thought and an incompleteness of education, most mischievous to the best interests of the profession.[62]

Allbutt was also keen on introducing Trousseau's surgical technique into English medicine. He considered himself to be the first to introduce Trousseau's paracentesis, surgical puncture of the abdominal cavity for the aspiration of peritoneal fluid, into

[59] Chance, 'Sir Clifford Allbutt', p. 824.
[60] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 27. Allbutt and Teale were also active in ophthalmic research and they published several papers on the subjects.
[61] Ibid., p. 32.
[62] Anonymous, 'Case of Paracentesis Pericardii Recovery (under the Care of Dr. Clifford Allbutt) – Clinical Remarks', *Medical Times and Gazette*, 1866, ii: 474. Cited in ibid.

the Leeds Hospital or even into England.[63] In his paper on the treatment of pleuritic effusion delivered at the Annual Meeting of the British Medical Association at Manchester in 1887, he preached Trousseau's plan of tapping before this method became general practice.[64]

Allbutt's linguistic ability also played a role in the formation of his broad-minded medical thinking. I have already commented on Allbutt's French connections. During Allbutt's study in Paris, Trousseau asked Allbutt to translate his *Clinique Médicale* into English. Although Allbutt eventually did not take up this project, Trousseau's request indicates that Allbutt knew French. Although Allbutt did not study in Germany, the fact that he reviewed Carl Wunderlich's monograph, *Das Verhalten der Eigenwärme in Krankheiten,* (*On the Temperature in Disease: A Manual of Medical Thermometry*) before it was translated into English implied that he read German.[65] Moreover, Rolleston also pointed out that Allbutt reviewed German books in the *Classical Review*.[66] Allbutt's knowledge of up-to-date research publications in French and German was evident. For example, in *On the Use of the Ophthalmoscope*, he often referred to French and German ophthalmologists, such as Louis Auguste Desmarres, Xavier Galezowski, Jules Sichel and Albrecht von Gräfe. He remarked that Sichel and Gräfe's contribution to the field was great:

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[63] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 18.
[64] Ibid., p. 14.
[65] According to E. Ashworth Underwood, Wunderlich's book was published in 1868. Allbutt reviewed it in 'Medical Thermometry' which was published in *The British and Foreign Medico-Chirurgical Review* in 1870. The English translation of Wunderlich's book, however, was published in 1871 by the New Sydenham Society. (See E. Ashworth Underwood, 'Clifford Allbutt, Scholar-Physician and Historian', *Proceedings of the Royal Society of Medicine Section of the History of Medicine*, 1963, lvi: 13.)
[66] For instance, in 1897 Allbutt reviewed in the journal four German books on the works of Hippocrates. In 1910, he reviewed Axon Nelson's *Text und Studien: Die Hippocratische Schrift.* (For details, see Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 136 and p. 198.) Furthermore, Allbutt also participated in German publications. In 1875, he co-edited with others a German medical treatise, entitled *Die Ueberanstrengung des Herzens; sechs Abhandlungen,* (*The Overstraining of the Heart; Six Treatises*) which was published in Berlin. All this points to the conclusion that Allbutt read German.

> It is difficult to say to whom we owe the first important and careful observations of the modes of consecutive disease of the optic nerves. Sichel and Gräfe were perhaps the principal workers at first in this new field of observation, and the well-known essay of the latter, 'Ueber Complication von Sehnerven Entzündung mit Gehirnkrankheiten,' in the 'Archiv. Für Ophth.' Band VII. Abtheilung ii. S. 58, published in 1860, drew general attention to the great importance of the subject.[67]

Compared with Continental ophthalmic research, the English, Allbutt noted, was falling behind.

> The number of physicians who are working with the ophthalmoscope in England may, I believe, be counted upon the fingers of one hand. If I may judge from the publications of Galezowski and Bouchut, it would seem that the same reproach cannot attach to our Continental neighbours, who will, therefore, unless we bestir ourselves, make this large field of observation more especially their own.[68]

There are several instances which can prove that Allbutt was keen on introducing into England German medical technology. For example, in 1880, Allbutt read two papers at the Annual Meeting of the British Medical Association. One of them, 'Remarks on Dilatation of the Stomach and its Treatment', was about washing out the stomach, which was first practised by Adolf Kussmaul in 1869. Moreover, in 'Dilatation of the Stomach', his article in *A System of Medicine*, Allbutt preached in favour of the use of the stomach pump invented by Kussmaul. He said that "in 1869 the stomach pump was the means of lavage; soon afterwards a syphon, such as is now used, was made for me [Allbutt] by Messrs. Harvey and Reynolds, of Leeds,

[67] Allbutt, *On the Use of the Ophthalmoscope*, p. 10.
[68] Ibid., p. 9.

and the same improvement soon suggested itself to other physicians."[69] This exposure to French and German medical research, I think, partly explains Allbutt's complaint about the London clinical culture.[70]

Allbutt's inclination to look to the Continent, especially Germany, to find a model for the reform of English medicine was reinforced by his association with several key colleagues who shared his knowledge and esteem for Continental medicine. For instance, Allbutt's life-long friend, George Henry Lewes, had lived in Germany and frequently visited France. He was also associated with several leading Continental and English scientists and thinkers of the time. Lewes was a literary critic, a playwright and the author of several books on the biological sciences.[71] He mastered German and French and occasionally stayed in Germany for one or two years. In his 1858 stay, he entered the circle of Justus Freiherr von Liebig, the prominent German chemist; and Jacob Moleschott, Professor of physiology in Zurich.[72] He was also engaged in laboratory work at Munich and started making a name for himself in the world of science. His book, *The Physiology of Common Life*, was published in 1859 and his paper, 'The Spinal Cord a Sensational and Volitional Centre', was read by

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[69] Clifford Allbutt, 'Dilatation of the Stomach', *A System of Medicine*, 1st ed., 8 vols, London, Macmillan and Co., Ltd, 1897, vol. 3, p. 512. Cited in Rolleston, 1929, p. 77.

[70] It should be noted that Allbutt could also obtain German medical knowledge from English medical journals. *The British Medical Journal*, for instance, was a rich resource for the dissemination of German medical research. From 1860 to 1870, there were seventeen articles in the journal about Rudolf Virchow, three about Adolf Kussmaul and three about Justus Freiherr von Liebig. From 1871 to 1880, there were twelve articles about Virchow, two about Robert Koch, one about Wilhelm von Leube and one about Franz Riegel. From 1881 to 1890, there were twenty-two articles about Virchow, twenty-four about Koch, two about Kussmaul, one about Riegel and one about Carl Ludwig. All this indicates that there was no difficulty in Allbutt and others keeping up to date with medical developments in Germany.

[71] Lewes wrote articles for several journals, such as *the British and Foreign Review*, *the Foreign and Quarterly Review* and *the Westminster Review*. He was the co-founder of the journal, *Leader*, with Thornton Leigh Hunt. He was also the author of *Seaside Sketches* (1858), *The Physiology of Common Life* (1859), *Studies in Animal Life* (1862), *Problems of Life and Mind* (2 vols, 1873-1879), *The Physical Basis of Mind* (1877) and many other literary and philosophical texts. (For details, see David Williams, *Mr George Eliot: A Biography of George Henry Lewes*, London, Hodder and Stoughton, 1983.)

[72] Ibid., p. 180.

Richard Owen in the twenty-eighth meeting of the British Association of the Advancement of Science.[73]

Lewes widely read Continental philosophers, such as Wilhelm Friedrich Hegel, Benedict Baruch Spinoza and Auguste Comte.[74] He was associated with Comte and appreciated Comte's *Positive Philosophie*. Lewes had visited Comte twice, the first time in 1843 and the second in 1846.[75] They corresponded frequently.[76] In 1871, Lewes published an introductory text of Comte's *Cours de Philosophie Positive*, which was entitled *Comte's Philosophy of the Sciences: Being an Exposition of the Principles of the Cours de Philosophie Positive.*

Lewes was an associate of John Stuart Mill and a good friend of Herbert Spencer, who had immense influence upon John Hughlings Jackson.[77] Apart from forming the 'gang of neurologists' with Allbutt, Hughlings Jackson and others, Lewes also assisted Allbutt in the microscopic work and the preparation of plates in Allbutt's monograph, *On The Use of the Ophthalmoscope*. George Eliot, Lewes' partner, was also a good friend of Allbutt.[78] As is well-known, Allbutt was said to be the

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[73] Ibid., p. 182.
[74] Ibid., p. 33.
[75] Ibid., p. 54.
[76] See William Baker (ed), *The Letters of George Henry Lewes*, 3 vols, Victoria (British Columbia), English Literary Studies, University of Victoria, 1995, vol. 1, p. 130-131; 142-146; 164-165; 169-170; 206; 229-230.
[77] Lewes' good friendship with Spencer can be seen in the following episode: Lewes had a bad time in 1850 due to an affair between his first wife, Agnes Swynfen Jervis, and Thornton Leigh Hunt. (Op., cit., Williams, *Mr George Eliot*, p. 69.) During the bad moments, Lewes found the greatest consolation from his friendship with Spencer. In his diary, Lewes wrote:

> I owe him [Spencer] a debt of gratitude. My acquaintance with him was the brightest ray in a very dreary, *wasted* period of my life. I had given up all ambition whatever, lived from head to mouth and thought the evil of each sufficient. (Cited in ibid., p. 70.)

Spencer also contributed articles to the *Leader*, announcing his studies of Lamarckian evolution. (Ibid.) Intellectually, Lewes and Spencer found each other inspiring.
[78] The intimate friendship between Eliot and Allbutt is revealed in their correspondences. For instance, in one of Eliot's letter to Allbutt, she wrote: "I confess to a little disappointment that you were hurried away from us too soon for me to have a quiet tête-à-tête with you, for there are things which one likes to say much better than to write". (Op., cit., Eliot, 'GE to Clifford Allbutt, London, 30 December 1868', vol. 4, p. 499.)

prototype of Tertius Lydgate, a character in Eliot's novel, *Middlemarch*, published in 1872.[79]

In chapter four, which is about Allbutt's criticism of the morbid entity view of disease, I shall argue that both Allbutt and Lewes were critical of the figurative use of language in science papers. Their common view, I suggest, might be due to their background of German language and science.

Two important colleagues of Allbutt at Cambridge, Alfredo Antunes Kanthack and German Sims Woodhead, were closely associated with German medicine (the details of Allbutt's co-operation with Kanthack and Woodhead will be discussed in chapter three). Kanthack was appointed Professor of Pathology at Cambridge in 1897. After completing his M.B. in 1885 and M.Sc. in 1886 at University College London, he practised at St. Bartholomew's Hospital. In 1889, he went to Berlin for pathological research. He worked under Rudolf Virchow, Robert Koch and Carl Friedrich Krause. He wrote a paper on the histology of the larynx, which was later published in Virchow's Archives. Kanthack was an enthusiast for bacteriology. In 1890, he was appointed as one of the Commissioners by the Royal College of Physicians, the Royal College of Surgeons and the Executive Committee of the National Leprosy Fund to investigate leprosy in India. In 1891, he was elected John Lucas Walker Student at Cambridge. At Cambridge, he lectured on pathology and bacteriology. Kanthack published several papers on bacteriology and immunity. Particularly remarkable was the one on Madura Disease, in which he demonstrated the parasitic nature of the disease and its close resemblance with actinomycosis; the

[79] Some of Lydgate's history resembled that of Allbutt. For instance, like Allbutt, Lydgate was attracted to medicine by reading Auguste Comte's *Philosophie Positive*. Like Allbutt, Lydgate also studied in Paris and was in charge of a fever hospital where "he treated fever on 'a new plan' with success (In 1865 and 1866, Allbutt treated typhus fever with his own 'open-air method' in the Leeds House of Recovery with success)." (Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 59-60.)

one on the tsetse fly disease and another one on the infectivity of milk as supplied to the consumer in regard to tuberculosis. Other published works included *A Manual of Practical Morbid Anatomy* and *A Handbook of Practical Bacteriology*.[80]

Woodhead succeeded Kanthack in 1898 and thereafter became Allbutt's close associate at Cambridge. Woodhead studied medicine at Edinburgh University. After graduating in 1878, he proceeded to further studies in Berlin and Vienna, where he had the opportunity to expose himself to Continental medical thinking. Having returned to England, he participated in a voluntary class in practical pathology run by David James Hamilton (afterwards Professor of Pathology at Aberdeen). Suggested by Hamilton, Woodhead proceeded to his M.D. on the pathology of the medulla oblongata. Woodhead finished his M.D. in 1881 and obtained for his thesis the gold medal. After qualifying, he became Demonstrator in Pathology in Edinburgh University. In 1898, he was appointed Professor of Pathology at Cambridge.[81]

Both Woodhead and Allbutt were founding members of the Pathological Society of Britain and Ireland ('The Pathological Society' hereafter), which was aimed at encouraging experimental pathology as an alternative to the morbid-anatomical tradition treasured by the Pathological Society of London.[82] It also represented a

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[80] Anonymous, 'Obituary of Alfredo Antunes Kanthack', *The Lancet*, 1898, ii: 1817-1818.

[81] James Ritchie, A. E. Boycott, and H. R. Dean, 'Obituary of Sir German Sims Woodhead', *In Memoriam: Sir German Sims Woodhead*, reprinted ed. by Oliver and Boyd, Tweeddale Court, 1923, pp. 2-3.

[82] The history of the Pathology Society of Britain and Ireland ('the Pathological Society' hereafter) was well documented by James Henry Dible. According to Dible, in 1906, a circulation which suggested the formation of the Society was signed by a group of pathology professors and prominent medical men. These professors included Woodhead (Cambridge), William Smith Greenfield (Edinburgh), Richard Muir (Glasgow), David James Hamilton (Aberdeen), James Lorrain Smith (Manchester), James Ritchie (Oxford), Rubert William Boyce (Liverpool), Robert Fraser Calder Leith (Birmingham) John George Adami (McGill), Albert Sidney Frankau Grünbaum (Leeds) and others. Other supporters included, for instance, leading bacteriologists, such as William Bulloch, Sheridan Delépine, John William Henry Eyre, Almroth Edward Wright and William Boog Leishman; specialists in tropical medicine, such as David Bruce and Patrick Manson; physicians, such as Allbutt, William Osler, Humphry Davy Rolleston, Archibald Edward Garrod and Arthur Hall; professors in physiology, such as Noël Paton and Thomas Gregor Brodie; and veterinarians such as John McFadyean. Regarding morbid anatomy as a very useful, but not the only, means of disease investigation, these members strongly encouraged animal experimentation, laboratory work and

movement to promote experimental pathology at the turn of the century. In 1907, the Pathological Society formed an affiliation in with *The Journal of Pathology and Bacteriology*, a leading journal in experimental pathology founded by Woodhead, and officially took over Woodhead's control in 1920.

Another of Allbutt's associates with a strong German medical background was William Osler, well-known as Professor of Medicine and Physician-in-Chief at Johns Hopkins and later as Regius Professor of Medicine at Oxford. Osler finished his M. D. at McGill University. After that, he studied in London (practising laboratory work under John Burdon-Sanderson), Berlin and Vienna. Throughout his career, Osler was enthusiastic for promoting the German methods of teaching medicine.[83] After joining the Johns Hopkins Hospital in 1888, he synthesized the English and German system

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bacteriological research. (See James Henry Dible, *A History of the Pathological Society of Great Britain and Ireland*, London, Oliver and Boyd Ltd, 1957, p. 1.)

Before the Pathological Society was founded, there had already been an established organization of pathology in London, namely, the Pathological Society of London ('the London Society' hereafter). Whereas the Pathological Society was founded mainly by professors of pathology, the London Society was founded by a group of hospital physicians. (George J. Cunningham has pointed out that the London Society was not the first pathological society in the United Kingdom. The first one was the Dublin Society, founded in 1838. The second one was the Reading Society founded in 1841. For details, see George J. Cunningham, *The History of British Pathology*, Bristol, White Tree Books, 1992, p. 67.) The London Society was established in 1847 and its first President was Charles James Blasius Williams, who was a pupil of Laennec. Williams was a London physician and Professor of Medicine at University College. Most of the members of this society were either physicians or surgeons. Of its thirty Presidents, only one, John Burdon Sanderson, was an experimentalist. Of its one hundred and thirty members during the period 1847 to 1907, only three were not Londoners and there was only one Professor in pathology, who was Walter Hayle Walshe, Physician and Professor of Pathological Anatomy of University College. (Dible, *A History of the Pathological Society*, p. 3.)

The London Society favoured a pathology based on pathological anatomy and physical observation. As Dible points out, most of the London medical schools were subordinate to London hospitals, "which were highly independent institutions, proud of their long history and tradition, dominated by honorary physicians and surgeons with striking personalities". (Ibid., p. 4.) The Londoners, rooted in the morphological tradition, were slow in accepting experimentation, which to them was physically, materially, and mentally costly. (Ibid.)

After the Pathological Society was founded, the London Society merged with the Royal Society of Medicine in 1907 and became the Pathological Section of the latter. Thereafter, the Pathological Society became the leading organization in the field. (Ibid., p. 13.) The formation of the Pathological Society indicated a jettisoning of the morphological approach treasured by the London physicians and surgeons. It 'freed' experimental pathologists from possible disagreements, in terms of the direction of research and finance, raised by the Londoners. The foundation of the Pathological Society also represented a shift from a pathology based on morbid anatomy and clinical observation to a pathology based on experimentation; from analysis of the corpse to the manipulation of the living animals; from examining the consequences of disease (lesions) to analysing the process of disease (physiological experiments).

[83] Greenwood, *The Medical Dictator and Other Biographical Studies*, p. 153.

of medical education. On the one hand, he weighed bed-side practice over book-learning and lectures. On the other hand, he introduced the German postgraduate training system, which consisted of one year of general internship followed by several years of residency with increasing clinical responsibilities. To refine the hospital unit system (which will be discussed in detail in chapter three), Osler introduced to the Johns Hopkins Hospital his German experience that each departmental head could choose a group of senior resident physicians as assistants.[84] Having accepted the Regius Professorship of Medicine at Oxford in 1905, he forcefully supported the introduction of scientific medical education to Oxford. For instance, he was influential in the creation of the Chair of Pathology which James Ritchie undertook. He was also involved in the establishment of pharmacology at Oxford and having Charles Sherrington appointed to the Chair of Physiology.[85]

Osler and Allbutt's friendship began before the former joined Oxford University. They had visited each other before Osler moved to England. When the first edition of *A System of Medicine* was published in 1896, Osler, in Baltimore, wanted to show his compliment by organizing a congratulatory dinner for Allbutt. However, maybe due to the South African War, such a generous offer was not realized.[86] A year later, Osler contributed an article, 'Malarial Fever' to the second volume of *A System of Medicine*.

After joining Oxford, Osler had closer co-operations with Allbutt. For instance, 'The Brothers Regii' were actively involved in the foundation of the Pathological Society of Great Britain and Ireland in 1906, which I have discussed earlier.[87] In 1907, both of them were appointed to the management committee for the study of

[84] Bliss, *William Osler: A Life in Medicine*, p. 175.
[85] Ibid., p. 344.
[86] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 64.
[87] Ibid., p. 177.

special disease, whose research hospital later became Cambridge Hospital for Special Disease. When the Royal Society of Medicine developed the Section of the History of Medicine in 1912, Osler was the first President and Allbutt and Norman Moore were Vice-Presidents.[88] In 1919, both Osler and Allbutt were elected Honorary Fellow of the Royal Society of Medicine. Osler was also involved in some of the projects launched by the Medical Research Committee of which Allbutt was a founding member.

Intellectually, Osler and Allbutt also had a number of parallels. Both of them were interested in the history of medicine. While Allbutt wrote *Greek Medicine in Rome*, Osler delivered a series of lectures on the history of medicine for the Silliman Foundation. These lectures were published after his death with the title, *The Evolution of Medicine*.[89] In addition, both of them were supporters of experimental pathology and the implementation of the hospital unit system in England.

Some of Allbutt's associates, such as Charles Creighton and Clinton Thomas Dent, were translators of German medical treaties published by the New Sydenham Society.[90] Creighton studied medicine in Aberdeen and Edinburgh. After obtaining his M. D. in 1878, he spent a long time visiting Virchow's Institute in Berlin. He also

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[88] Ibid., p. 205.
[89] Greenwood, *The Medical Dictator and Other Biographical Studies*, p. 163.
[90] The New Sydenham Society was formed in 1858, with Charles James Blasius Williams as President and Jonathan Hutchinson as Secretary. The aim of the Society was to reprint good but rare English medical works and to translate ancient and modern valuable classics into English. The range of publications was wide, including important papers, lectures and translated texts of distinguished foreign or ancient authors. (See Geoffrey Guy Meynell, *The Two Sydenham Societies: A History and Bibliography of the Medical Classics Published by the Sydenham Society and the New Sydenham Society (1844-1911)*, Folkestone (Kent), Winterdown Books, 1985, p. 6.)
The New Sydenham Society was the successor of the Sydenham Society, which was formed in 1843 with Sir Henry Halford as President. (Ibid., p. 2.) The Sydenham Society had its largest membership in 1845 but the membership declined in 1857. This was because most members were dissatisfied with the books they received; the Committee was not transparent to the members and was indifferent to their comments. (Ibid., p. 5.) In a meeting in 1857, Hutchinson opposed a motion which was nevertheless passed by the Committee. John Forbes, Chair of the meeting, said that "if some young men thought the Society's work was not finished, they had better form a new one for themselves." Eventually Hutchinson and some others did so and this was how the New Sydenham Society was founded. (Ibid.)

visited Vienna and attached himself particularly to Josef Skoda and Karl Rokitanski.[91] He translated for the New Sydenham Society August Hirsch's *Handbook of Geographical and Historical Pathology* (3 vols, London, 1883-1886). Dent was Surgeon to St. George's Hospital.[92] He translated for the New Sydenham Society T. Billroth's *Clinical Surgery: Extracts from the Reports of Surgical Practice Between the Years 1860-1876* (London, 1881). Both Allbutt and Dent were mountaineers. They were members of the Alpine Club and they contributed articles to *The Pioneers of the Alps* published in 1888.[93] Moreover, Allbutt, Dent and Creighton were members of The Sunday Tramps, "established in 1879, aiming at exploring the country around London."[94]

All in all, It is evident that Allbutt's circle included people knowledgeable about the German language and/or German medicine. Generally speaking, they privileged medical research and experimental pathology; some of them, like Woodhead and Osler, also aimed to reform English medicine to become more scientific. This 'German' social character, in addition to Allbutt's all-round medical training and early practice, formed the basis of the Cambridge Regius Professor's criticism and reform of contemporary English medicine. These factors could also explain Allbutt's

[91] After visiting Berlin and Vienna, Creighton returned to England and was appointed Medical Registrar at Charing Cross Hospital and then Surgical Registrar at St. Thomas's Hospital. Later, he was also appointed Demonstrator of Anatomy at Cambridge. In the final stage of his career he worked in the British Museum and other libraries in London. During that period he completed *History of Epidemics in Great Britain*. Before this historical work, he had also published several medical treaties, such as *Contributions to the Physiology and Pathology of the Breast and its Lymphatic Glands* (1878), *Bovine Tuberculosis in Man* (1881), *Illustrations of the Unconscious Memory of Disease* (1886), *Contributions to the Physiology and Pathology of the Breast* (1886), *Microscopic Researches on the Formative Property of Glycogen* (two parts, 1896-99), *Cancers and Other Tumours of the Breast* (1902) and *Contributions to the Physiological Theory of Tuberculosis* (1908). (See William Bulloch, 'Obituary of Charles Creighton', *The Lancet*, 1927, ii: 250-251.)

[92] Dent was educated at Cambridge University and entered St. George's Hospital in 1872. He also held various teaching posts in the hospital and its medical school. Apart from translating Billroth's work, Dent also contribute several articles to *Dictionary of Practical Surgery* edited by Christopher Heath and *Dictionary of Psychological Medicine* edited by Hack Tuke, and was the author of *Nature and Significance of Pain*. (Anonymous, 'Obituary of Clinton Thomas Dent', *The Lancet*, 1912, ii: 730-732.)

[93] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 50.

[94] Ibid., p. 101.

resistance to the London clinical culture even if he had practised at St. George's Medical School in his early days.

4 Biological thinking in medicine

The introduction of biological thinking into medicine was also an important theme in Allbutt's intellectual outlook, as I will discuss later, particularly in chapter five. In that chapter, I discuss Allbutt's criticism of the anthropocentric character, as he conceived, in English medicine and his advocacy of comparative pathology, a subject scarcely recognized in English human medicine before 1920s. Using the word 'advocacy' to describe Allbutt's role in comparative pathology is accurate because he was not a comparative pathologist. His role, rather, was a spokesman and an organizer of the discipline. From the 1880s until his death, he actively spoke for the importance of the discipline in his speeches. For instance, in August 1882 the British Medical Association celebrated its Jubilee at Worcester. In that meeting, Allbutt was President of the Section of Medicine. In his Presidential address 'Modern Freedom of Thought and Its Influence on the Progress of Medicine' he called for the recognition of comparative pathology.[95] In 1888, the British Medical Association met at Glasgow. Allbutt received an honorary LL.D. degree and delivered his most important address on the subject 'On the Classification of Diseases by Means of Comparative Nosology'. In that address, he likened comparative pathology as the *Novum Organon* of medicine and systematically argued for the importance of the discipline.[96] In other addresses, such as, 'Medicine and the People' (1919), 'The New Birth of Medicine' (1919), 'The University in Medical Research and Practice' (1920) and 'The Integration of Medicine' (1923), he also discussed the place of comparative pathology in medicine. Apart from speaking to medical elites, Allbutt also publicized

[95] Ibid., p. 84.
[96] Ibid., p. 93.

his views in The Times (London). For example, in his letter dated 8th December 1919 and headed 'Medical Research: the Claims of Comparative Pathology', he said:

> To establish in Cambridge a central Institute of Comparative Pathology, which must include professorial units for the diseases of plants and animals and the means of blending these departments with the neighbouring departments of the diseases of man, will no doubt cost much money, but a sum which, when compared only with the waste and destruction of stock and crops, which I have deplored, would prove to be small indeed. Such is the utilitarian promise; but far beyond this we cannot tell how bright will be the cross lights which in a system of comparative medicine will be thrown reciprocally upon the fields of the several pathologies of all kinds of life.[97]

Four years later, Allbutt's vision was realized. In 1923 the Cambridge Institute for Research in the Pathology of Animal Diseases was established and James Basil Buxton was appointed as Professor of Animal Pathology.

As an organizer, Allbutt took up the first Presidency to the Section of Comparative Medicine of the Royal Society of Medicine founded in 1923. Although he presided over the Section for one year only (serving only half a term), probably due to his old age of eighty-seven, he was one of the few in human medicine to see the potential of this new discipline and to promote its institutionalization. In his Presidential address, 'The Integration of Medicine', he remarked that the hard work contributed by various supporters of the discipline was rewarding:

> If for years slowly and almost silently our work makes its way we must be content; our experience of the world teaches us to be content; but happily,

[97] Cited in ibid., p. 243.

> now and then, after long hewing in the dark forest, we break into the light; we find ourselves almost suddenly upon a peak, our way open and bright before us, and our cause justified before men. Such a festival is our meeting to-day.[98]

In short, instead of research, Allbutt's contribution to comparative pathology laid in the justification, institutionalization and popularization of the subject. In chapter five, I will discuss Allbutt's argument for developing comparative pathology as a means to make medicine a biological science. I also argue that his argument was distinctive.

I will also discuss the comparative-pathological research of Allbutt's associates, including James Paget (plant pathologist), John Bland-Sutton (comparative anatomist), German Sims Woodhead (bacteriologist) and Frederick Hobday (veterinarian). This is because (1) Allbutt himself was not a comparative pathologist and (2) since in his argument, Allbutt justified the discipline in terms of its intellectual value, a discussion of the substantial knowledge exclusively made by comparative pathologists would be very helpful to illustrate Allbutt's main point in the argument. I also discuss how comparative-pathological knowledge was disseminated before the discipline was officially recognized by human medicine. These are largely unexplored areas in the historiography of medicine.

My central argument in chapter five is that Allbutt's evolutionist framing of comparative pathology was a step to making medicine a biological science. In the late nineteenth century, the term 'biology' often appeared in medical discourse. It became common to describe pathology as a biological science. For instance, in his book, *Evolution and Disease*, (1890), John Bland-Sutton, Surgeon to Middlesex Hospital, claimed that pathology was part of biology:

[98] Clifford Allbutt, 'The Integration of Medicine: President's Introductory Address to the Section of Comparative Medicine of the Royal Society of Medicine', *The Proceedings of the Royal Society of Medicine*, 1923, Section of Comparative Medicine, p. 1.

> As a matter of fact Pathology is only a department of Biology, and it is very important to bear this in mind if we wish to study successfully the origin, cause, and spread of disease.[99]

In his article, 'Transformation and Descent', published in *The Journal of Pathology and Bacteriology* in 1892, Virchow, one of the international collaborators of the journal, argued that pathology became a branch of biological studies through his introduction of cellular pathology – the study of morbid changes of the cell:

> ...it is necessary, rather, to regard it (pathology) as a branch of biology equal in importance to physiology...It has been the main object of my life to expound this biological character of pathology in its various details, and I trust I have done so not without some success...This biology of disease is comprehensible only from the cellular stand-point..."[100]

The link between medicine and biology continued in the early twentieth century. In his report, *Some Notes on Medical Education in England: A Memorandum Addressed to the President of the Board of Education* (1918), George Newman, Public Health Officer (1900) and Chief Medical Officer of the Ministry of Health (1919), claimed that the medical man should be a biologist:

> The medical man must be first and last, and all through, a biologist, and adept in that particular branch of biology known as physiology. Anatomy and physiology are the bedrock of Medicine; they will be reached through biology, physics and chemistry; they will lead on inevitably to the advanced subjects of his study.[101]

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[99] John Bland-Sutton, *Evolution and Disease*, London, Walter Scott, 1890. p. 2.
[100] Rudolf Virchow, 'Transformation and Descent', *The Journal of Pathology and Bacteriology*, 1892-93, i: 3.
[101] George Newman, *Some Notes on Medical Education in England: A Memorandum Addressed to the President of the Board of Education*, London, His Majesty's stationery office, 1918, p. 16.

Allbutt also made a similar claim. In 'The Integration of Medicine', he remarked that in *The Times* (London) on June 5, 1906, he had written a letter calling for the recognition of pathological biology as an area of study. He also described the Opening Meeting of the Section of Comparative Medicine of the Royal Society of Medicine as a celebration of "the unity of medicine as a biological study".[102] "Your Society", he said, "now shares with Cambridge University [in which the Institute for Research in the Pathology of Animal Disease was founded also in 1923] the honour of being first in the field to recognize that disease has to be studied as a biological whole".[103]

All this indicated that there was a continuous effort to make medicine a biological science. In short, the relation between medicine and biology was created based on (1) the rise of cellular pathology; (2) research on the variations of bacterial virulence;[104] (3) the application of evolution to explanations of infectious diseases changing types;[105] (4) comparative-anatomical research on the evolution of organic structures and their functions; and (5) the broadening of the meaning of the term, 'biology', in

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[102] Allbutt, 'The Integration of Medicine', p. 1.

[103] Cited in Penelope Hunting, *The History of the Royal Society of Medicine*, London, The Royal Society of Medicine Press Ltd, 2001, p. 367.

[104] J. Andrew Mendelsohn has convincingly argued that Louis Pasteur, Charles Chamberland, Emile Roux and others' research on the attenuation and augmentation of virulence produced a biological dimension for bacteriology. These bacteriologists regarded changes in the virulence of bacteria as biological variations which were hereditary and evolutionary. They also argued that their experiments mirrored the development of infectious diseases in nature. Robert Koch confirmed Pasteur's attenuation work in his laboratory and basically had no disagreement with this kind of research done by the Frenchman. What Pasteur and Koch differed was their different etiological conclusions drawn from the phenomenon of the variations of virulence. (See J. Andrew Mendelsohn, '"Like All That Lives": Biology, Medicine and Bacteria in the Age of Pasteur and Koch', *History and Philosophy of the Life Sciences*, 2002, xxiv (no. 1): 1-35) The biological significance of the research on variable virulence, Mendelsohn argues, is overlooked by historians who have created a misleading historiography which distanced late nineteenth-century bacteriology from biology. Bacteriology, Mendelsohn argues, "became experimental biology before biology itself is supposed to have become experimental." (Ibid., p. 6.)

[105] For the application of evolution to explanations of infectious diseases changing types, see Bynum, 'The Evolution of Germs and the Evolution of Disease: Some British Debates, 1870-1900', *History and Philosophy of the Life Sciences*, 2002, xxiv (no. 1): 53-68.

the late nineteenth century.[106] To add to all this, I argue in chapter five that Allbutt intellectually integrated medicine and biology through his advocacy of comparative pathology.

In her book, *Animals and Disease: An Introduction to the History of Comparative Medicine*, Lise Wilkinson charted the development of comparative medicine in England, the Continent and America. She focused on (1) bacteriological research, such as Jean-Baptiste Auguste Chauveau, Louis Pasteur, John Burdon Sanderson and others' investigations of diseases transmissible from animals to humans such as rabies, anthrax and foot and mouth disease;[107] (2) institutional developments, such as the establishments and developments of the Brown Institute, the Lister Institute and the Rockefeller Institute.[108] In Wilkinson's account, the domain of comparative-pathological studies seems to be limited to bacteriological investigations of zoonoses. The idea of evolution of organic structures and functions is overlooked and comparative studies of non-infectious diseases are inadequately explored. My account in chapter five can be regarded as complementary to Wilkinson's. It will show that comparative medicine, in the light of evolution, is far more than bacteriology.

My discussion in chapter five does not exclude infectious disease. I focus on tuberculosis, not only because it was the major killer disease of the nineteenth century, but also because of my intention of (1) providing a balanced account of

[106] Joseph A. Caron has argued that biology was made a scientific discipline by Thomas Huxley and his followers in the mid-nineteenth century. Huxley gave biology a specific but controversial definition, which was later modified by his followers, who were prominent figures of various life sciences, such as Michael Foster, Edwin Ray Lankester, Henry Newell Martin, William Rutherford and William Turner Thiselton-Dyer and others. By the turn of the century, biology became an ensemble of physiology, pathology, embryology, botany, zoology, bacteriology, etc. For details, see Joseph A. Caron, '"Biology" in the Life Sciences: A Historiographical Contribution', *History of Science*, 1988, xxvi: 223-268.
[107] Jean-Baptiste Auguste Chauveau was a French veterinary surgeon.
[108] See Lise Wilkinson, *Animals and Disease: an Introduction to the History of Comparative Medicine*, Cambridge, Cambridge University Press, 1992.

various approaches to justifying comparative pathology; and (2) discussing the work of German Sims Woodhead, who was Allbutt's close associate. Such a focus, I hope, does not present an over-simplified view of the reception of germ theories, the opposition to which has been described by Michael Worboys. Worboys has convincingly argued that it was a complicated and controversial process in the second half of the nineteenth century for medical men to change their view of consumption from an inherited constitutional affliction to a specific contagious disease. During this process, the 'seed and soil metaphor' was adopted, in different reformulations, to provide a middle-ground view between the constitutional and the disease-agent views.[109] Moreover, veterinarians' acceptance of germ theories did not imply their acceptance of germ practices.[110] My discussion in chapter five should be regarded as complementary to such a complexity introduced by Worboys.

5 Allbutt the historian

The last major theme in my discussion of Allbutt is his attention to the history of medicine. As Maurice Mandelbaum points out, "one of the most distinctive features of nineteenth-century thought was the widespread interest evinced in history."[111] In that century there was a tendency "to view all of reality, and all of man's achievements, in terms of the category of development".[112] This tendency was generally called historicism. Historicists regarded individual events or specific

[109] Worboys, *Spreading Germs*, ch. 6.
[110] According to Worboys, veterinarians' attitude towards germ practices, such as laboratory investigations of germs and preventive inoculation, was diverse. Some veterinarians regarded germ practices as an intrusion of their interest and established authority. Even though they accepted that certain diseases were contagious, they still preferred to use slaughtering and quarantine measures, rather than germ practices, to stop infections. Others wanted to promote the idea that veterinary medicine had become a laboratory science or to argue for the importance of comparative pathology. For these veterinarians, germ practices were described in their arguments as efficient means to cure infectious diseases. (See ibid., ch. 2.)
[111] Maurice Mandelbaum, *History, Man and Reason*, Baltimore, London, The Johns Hopkins Press, 1974, p. 41.
[112] Ibid.

periods of history as aspects of some larger process of development. They believed that these events or periods played a role within some longer-range pattern of development. Historicism, in various forms, was an influential intellectual current in the nineteenth century. Within this current, the appeal to history became a strong and common argumentative form in nineteenth-century writing, no matter whether the writers were historicists or not. History also meant much more than informing people of past events. It was used to convey or support certain ideals, morals and values, and it could also be used to shape the mentality of future generations.

In the late nineteenth and early twentieth century, medical history emerged as an academic discipline. There was an increasing number of medical practitioners participating in history writing, such as Julius Pagel and Max Neuburger, Osler, Allbutt, Norman Moore, D'Arcy Power and Charles Singer.[113] The historiographies of some of these historians have been critically discussed.[114] In 1889, Osler founded the Johns Hopkins Historical Club. William Henry Welch and John Shaw Billings were active members.[115] In 1912, Osler established a section for the history of

[113] Julius Pagel and Max Neuburger were German physicians and historians. Norman Moore was Consulting Physician to St. Bartholomew's Hospital. D'Arcy Power was Surgeon to St. Bartholomew's Hospital. Charles Singer was Physician to Dreadnought Hospital, Lecturer in the history of biological sciences at Oxford and later Lecturer in the history of medicine at University College London.

[114] For Pagel and Neuburger's historiographies, see Heinz-Peter Schmiedebach, 'Bildung in a Scientific Age', in Frank Huisman and John Harley Warner (eds) *Locating Medical History: The Stories and Their Meanings*, Baltimore and London, The John Hopkins University Press, 2004, pp. 74-94; for Osler and Henry E. Sigerist's historiographies, see Elizabeth Fee and Theodore M. Brown, 'Using Medical History to Shape a Profession: the Ideals of William Osler and Henry E. Sigerist', ibid., pp. 138-164.

[115] William Henry Welch was Professor of Pathology at Johns Hopkins Medical School. John Shaw Billings was Director of the New York Public Library and one of Allbutt's important American associates apart from Osler. Allbutt's association with Billings, apart from personal visits (Billings visited Allbutt at Cambridge in 1896 and Allbutt visited Billings at New York in 1898), can be seen in Allbutt's appreciation and reference to Billings' research. For example, in 'On the Classification of Diseases by Means of Comparative Nosology', Allbutt remarked:

> In the vital statistics of the United States census of 1880 Dr. Billings finds that cancer is rarer in coloured peoples, which traverses [probably meaning 'disagrees with'] somewhat our experience of the readiness of pigmented moles to set up melanotic cancer. Still the conclusion is well supported...(Clifford Allbutt, 'On the Classification of Diseases by Means of Comparative Nosology', *The British Medical Journal*, 1888, ii: 289.)

medicine in the Royal Society of Medicine and succeeded in attracting one hundred and sixty members.[116] Initially, he regarded Allbutt or Moore as the most suitable person to be the President. However, the younger members preferred him and he found it uncomfortable to decline.

> I was very anxious to have Allbutt or Norman Moore as President but the younger men would have neither of them, & insisted that I should be elected: I am sorry in a way as I am afraid Moore was rather hurt but I have had a nice talk with him about it.[117]

The Council of the Section consisted of one President, five Vice Presidents, two Honorary Secretaries, and fifteen other members. Allbutt was one of the Vice Presidents in the 1912 Council. Other Vice Presidents included Richard Caton, William S. Church, Henry Morris and Ronald Ross.[118] The Honorary Secretaries were Raymond Crawfurd and D'Arcy Power.[119] Osler, as Elizabeth Fee and Theodore M. Brown suggest, aimed to use the history of medicine as a tool for shaping the future of the medical profession.[120] In the Opening Meeting, Osler

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Moreover, the opening article in the first volume of *A System of Medicine*, edited by Allbutt, was Billings' article, 'Medical Statistics'. The article was a summary of Billings' Cartwright Lectures, delivered before the Alumni Association of the College of Physicians in New York in 1889. (For details, see Carleton B. Chapman, *Order Out of Chaos: John Shaw Billings and America's Coming of Age*, Boston, The Boston Medical Library, 1994, p. 233.)

[116] For a brief history of the Section of History of Medicine of the Royal Society of Medicine, see Hunting, *The History of the Royal Society of Medicine*, p. 330-333.

[117] Harvey Cushing, *The Life of Sir William Osler*, London, New York and Toronto, Oxford University Press, 1925, p. 1030. Cited in ibid., p. 331.

[118] Richard Caton was Physician to the Liverpool Royal Infirmary and Professor of physiology at Liverpool University College. William S. Church was Consulting Physician to St. Bartholomew's Hospital. Henry Morris was Senior Surgeon to the Middlesex Hospital. Ronald Ross was Malariologist in the Indian Medical Service, Lecturer in the Liverpool School of Tropical Medicine and Consultant Physician to King's College Hospital.

[119] Raymond Crawfurd was Dean of King's College Medical School. He became President to the Section of Comparative Medicine of the Royal Society of Medicine from 1916 to 1918. D'Arcy Power was President to the History of Medicine Section from 1918 to 1920.

[120] Fee and Brown argued that in different times Osler used history differently. "In the first phrase, he had used the history of medicine as an integral part of his medical teaching at [Johns] Hopkins to inspire the "weanlings of the fold" to enter the timeless profession with appropriately high ideals; in the second, as he got ready to leave Hopkins and settle in Oxford, he turned to medical history to validate the importance of experimental methods in the reconstruction of modern medical science, for practitioners and for himself; in the third phrase, he would attempt to establish a new professional

expressed his hope that "the Section would be a meeting-ground for scholars, students and all those who feel that the study of the history of medicine has a value in education". [121] The Council facilitated historical research and promoted the history of medicine in various ways. For instance, in 1913, it considered offering public lectures three times a year; creating a complete catalogue of the existing manuscripts of English medical writers; and investigating the history of various scientific discoveries, such as vaccination before Jenner and the idea of circulation before Harvey.[122] In each General Meeting, there were three to four presentations on various topics, such as John Rolleston's paper on 'The Medical Aspect of the Greek Anthology' (November, 1913); Charles Singer's paper on 'St. Hildegarde' (November, 1913); F. W. Cock's presentation of some old surgical instruments (November, 1913); C. E. Lea's paper on 'Dr. Thomas Spens – the First Describer of the Stokes – Adam syndrome' (May, 1914); Charles Singer's paper on 'Some Notes on the History of the Microscope' (May, 1914); Osler's paper on 'Suggested Scheme for the Restoration of the Tomb of Avicenna' (May, 1914).[123] Allbutt was not active in the Council; he was absent in all the Council Meetings during his appointment.[124] It seemed that he was simply a figurehead of the Section. His substantial contribution, rather, manifested itself in his historical writing.

Allbutt's most important historical work was *Greek Medicine in Rome*, published in 1921. The book consisted of a number of articles under the theme 'Greek Medicine in Rome'. It also included Allbutt's Finlayson Memorial Lectures on

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discipline of the history of science and medicine, not so much as part of medicine or for the benefit of physicians, but as a contribution to the intellectual and cultural history of Western civilization". (Fee and Brown, 'Using Medical History to Shape a Profession', p. 142.)

[121] Hunting, *The History of the Royal Society of Medicine*, p. 331.

[122] *Council Minutes: The History of Medicine Section of the Royal Society of Medicine*, The Royal Society of Medicine, 1912-1942, K46.

[123] *General Meeting Minutes: The History of Medicine Section of the Royal Society of Medicine*, The Royal Society of Medicine, 1912-1942, K48.

[124] *Council Minutes*, 1912-1942, K46.

'Byzantine Medicine'; an article on 'Salerno'; his Linacre Lecture in 1914 on 'Public Medical Service and the Growth of Hospitals'; the ninth Robert Boyle Lecture on 'The Rise of the Experimental Method in Oxford'; and other articles including 'A Chair of Medicine in the Fifteenth Century'; 'Medicine in 1800'; 'Medicine in the Twentieth Century'; and 'Palissy, Bacon, and the Revival of Natural Science'.

Allbutt held that he was engaged in the history of ideas. It seems that he was committed to a form of realism, in which ideas had their own reality and they 'participated' in the human world. During the 'participation', they might be nourished or corrupted by human beings:

> Yet I have found no pursuit more attractive than that of the sources, growths, and movements of ideas, and indeed their conflicts; *for ideas enter the vulgar world at their peril*! It is my hope then that the reader may find known materials so selected and compared as to refresh his interest in the story of the human mind...And wasteful as the order of this world has been, devastating as the destruction of libraries and schools, ideas once conceived have rarely perished; *for good or ill they have found foster-parents.*[125]

To say that ideas were nourished or petrified by humans, Allbutt must have had a criterion of the goodness and badness for ideas. In this respect, he was committed to the common intellectual tradition in the nineteenth century, romantic philhellenism, "the conviction that all that was best in Western civilization derived from the achievements of Greek antiquity".[126] As will be seen in chapter four, Allbutt spoke

[125] Clifford Allbutt, *Greek Medicine in Rome: the Fitzpatrick Lectures on the History of Medicine Delivered at the Royal College of Physicians of London in 1909-1910 with other Historical Essays*, London, Macmillan and Co. Ltd, 1921, viii-ix.
[126] Fee and Brown, 'Using Medical History to Shape a Profession', p. 141.

highly of Ancient Greek intellectuals, who, according to him, possessed the "spirit of search, of moderation, of reason, and of freedom".[127] In his view, the Romans, however, petrified Greek ideas:

> As Greece stood for ideas without social order, the function of Rome on the contrary was static, the establishment of order without ideas...The Roman was above all things, a man of action; in Rome, even more than elsewhere, ideas became rigid or rhetorical, and outlived their spirit.[128]

Roman medicine, Allbutt argued, contributed nothing to itself. All the good things in Roman medicine were imported from the Greek. This notion is also the theme of *Greek medicine in Rome*:[129]

> It is not, I think, fully realised that, while the Roman Empire held the political supremacy, in almost all the higher ranges of the human mind Athens was still held supreme. As she lost her independence as a city state she won the place of a world university. Thus Rome, always the armoury of ritual, had to import her ideas; herself contributing to them almost nothing.[130]

As I shall argue, Allbutt's historiography was not separated from his medical thinking. Allbutt's major medical views were formed around 1870s, and remained essentially unchanged until his death. His history writing was published much later, i.e. in the early twentieth century. This chronological point is important. It indicates that Allbutt had certain mature medical views before he examined the past.

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[127] Allbutt, *Greek Medicine in Rome*, x.
[128] Ibid., vii, ix.
[129] Lord Cohen of Birkenhead, 'The Rt. Hon. Sir Thomas Clifford Allbutt', p. 186.
[130] Allbutt, *Greek Medicine in Rome*, vii.

In this chapter, I have argued for the approach of the present work, introduced Allbutt from various angles and provided the background for subsequent chapters. In the next chapter, I will examine Allbutt's thought in detail. I begin with Allbutt's reform of contemporary English clinical medicine, with reference to the use of the ophthalmoscope and the clinical thermometer.

Chapter Two

Allbutt's Making of Clinical Medicine an On-Going Investigative Enterprise

1 Introduction

The Historigraphy of instrumentation in clinical medicine is usually about diagnosis. However, interestingly, in Allbutt's writing on the use of the ophthalmoscope and the clinical thermometer, the author emphasized the value of the instruments in medical research. In his monograph *On the Use of the Ophthalmoscope* published in 1870, Allbutt said, "I regard the application of the ophthalmoscope, not to the diagnosis only, but also to the investigation of modes of nervous change, as of very happy augury."[1] Allbutt discussed the importance of the instrument from a pathologist's point of view and regarded it as a very useful tool for the making of medical knowledge. Such a use of instruments for research purposes, I argue, is what makes him distinctive in the history of late nineteenth-century English medicine. In this chapter, I discuss Allbutt's argument that the use of the ophthalmoscope and the clinical thermometer could cultivate a research spirit and could reform English clinical medicine from routine curative practice to an on-going investigative enterprise. This change is significant in late nineteenth-century English medicine and it also indicates Allbutt's conception of the ideal medical man, who should not restrict his role to serving under conventionally divided departments, but should be a versatile and active investigator. With reference to his historical writing, I also examine how Allbutt broke down the boundary between the healer and the investigator of diseases. This re-construction of the physician's role is consistent and

[1] Clifford Allbutt, *On the Use of the Ophthalmoscope in Diseases of the Nervous System and of The Kidneys; also in Certain Other General Disorders*, London, Macmillan, 1871, p. 5.

continuous with his life-long protest against the division between medicine and surgery and his advocacy of the hospital unit system in the early twentieth century which will be discussed in the next chapter. All these pursuits, I think, should be regarded as different aspects of Allbutt's sculpting of the new medical man. In the light of this, Allbutt's role in the history of medicine should be seen as a critical reformer. Allbutt was a man who aimed to change the paradigm of English medicine. He was more than a physician or a Regius Professor of Physic.

This chapter is divided into eight sections. In section two, I first discuss some biographical details of young Allbutt, focusing on his career and ophthalmic research at Leeds. Next, I discuss the application of the experimental method in various nineteenth-century sciences. Section four is the central part of this chapter, in which I discuss Allbutt's criticism of 'the case-taking method' and his advocacy of the cultivation of a research spirit through the use of instruments in combination with the experimental method. I also argue that his argument was consistent with his appreciation of Robert Boyle as an experimenter. In section five and six, I concentrate on Allbutt's own ophthalmic and thermometric research, aiming to demonstrate how the ophthalmoscope and the thermometer could be used in the making of medical knowledge. Allbutt's argument that diagnostic instruments could be used as investigative tools has a historiographical import, which I will discuss in section seven. In that section, I use my case study of Allbutt to criticize Nicholas D. Jewson's well-known periodisation of medicine. I also suggest that this criticism supports John Pickstone's alternative model. Lastly, I close my discussion with some concluding remarks.

2 Allbutt's ophthalmic research at Leeds

Before discussing Allbutt's reform of English clinical medicine, it is important to understand how this reformer was associated with ophthalmology. In this section, I discuss Allbutt's early career at Leeds. The Leeds period is crucial to Allbutt's commitment to ophthalmic research and the development of his medical thinking.

The ophthalmoscope has a long history. Historians at different times, such as Jabez Hogg (1859), Arnold Sorsby (1938) and Daniel M. Albert (1996) agree that the instrument was invented to solve the problem of the luminosity of the eye, i.e. why the eyes of certain animals shine in certain conditions but remain dark in other conditions.[2] Before the instrument was invented, medical researchers, such as Adolf Kussmaul (1822-1902) and William Cumming (1812-1886), had examined the difference in the luminosity of various healthy and abnormal eyes and noted that such an examination might have medical value. In 1850, Hermann Helmholtz, a member of the 1847 group, [3] a physiologist and later a physicist, invented the ophthalmoscope.[4] The medical value of the instrument was demonstrated in England by Spencer Wells, John William Ogle, Johnathan Hutchinson and others.

While Wells is the first in England to insist upon the value of the ophthalmoscope in diseases of the eye, Ogle is the first in the same country to recognize, with the use of the instrument, the correlation between the cerebral and the intraocular circulation.

[2] See Daniel M. Albert's 'The Ophthalmoscope and Retinovitreous Surgery', in Daniel M. Albert and Diane D. Edwards (eds), *The History of Ophthalmology*, Oxford, Blackwell Science, 1996, p. 177; Arnold Sorsby, *A Short History of Ophthalmology*, London, Staples, 1938, p. 78; and Jabez Hogg, *The Ophthalmoscope; its Mode of Application Explained, and its Value Shown, in the Exploration of Internal Diseases Affecting the Eye*, London, John Churchill, 1859, p. 4.

[3] The 1847 group was composed of four elite physiologists who advocated a biophysical approach to physiological investigations in the mid-nineteenth century. Its members included Carl Ludwig, Hermann Helmholtz, Ernst Brüke and Johannes Müller. The group was formed in the year 1847. (Paul F. Cranefield, 'The Philosophical and Cultural Interests of the Biophysics Movement of 1847', *Journal of the History of Medicine and Allied Sciences*, 1966, xxi: 1.)

[4] It has been argued that Charles Babbage might have invented the ophthalmoscope earlier than Helmholtz. However, there was no formal record or material evidence to prove this. The only mention of Babbage's instrument was a brief note written by Thomas Wharton Jones in 1854. Yet, Helmholtz presented his instrument to the Berlin Physical Society in December 1850 and published a monograph on the instrument, *Beshreibung eines Augen-Spiegels*, in October 1851. Therefore, historians generally agreed that Helmholtz was the inventor of the instrument.

As early as 1860, Ogle had already argued that the variations of the vascular structure of the posterior parts of the eye might indicate the vascular conditions of the intracranial organs.[5] Ogle's research interested Allbutt. In *On the Use of the Ophthalmoscope*, Allbutt announced that it was Ogle who introduced him to ophthalmic research when they form an association at St. George's Hospital.

After graduating from Cambridge, Allbutt began his practice at Leeds in 1861, first at the Leeds House of Recovery, a fever hospital, and later in 1864 at the Leeds General Infirmary, to which he was appointed Physician and was promoted to Consulting Physician in 1884. He also occupied for a number of years the chair of 'Principles and Practice of Physic' and 'Materia Media and Therapeutics' at Leeds School of Medicine. At the Infirmary he became allied with Thomas Pridgin Teale Jr, who was particularly interested in ophthalmic surgery. Teale conducted a great deal of ophthalmic research with Allbutt. They published several papers on the subject, including papers on locomotor ataxia; epilepsy in association with disease of the optic nerve; atrophy of the optic nerve dependent on orbital disease; retinal diseases in association with disease of the kidney and atrophy of the optic nerve following typhus.[6] Their life-long association continued until Teale's death in 1924.

During the-'Leeds'-period, Allbutt also attached himself to the West Riding Hospital for the Insane, located at Wakefield, about sixteen kilometres from Leeds. The hospital was directed by James Crichton-Browne, who was enthusiastic in research and attracted young researchers such as David Ferrier, John Hughlings Jackson, William Turner, Lauder Brunton, Milner Fothergill, Allbutt and others to conduct ophthalmic research at the hospital.[7] At this time, the view that the fundus of

[5] Burton Chance, 'Sir Clifford Allbutt, the Apostle of Medical Ophthalmoscopy', *Archives of Ophthalmology*, 1937, xvii (no.5): 823.
[6] Ibid., p. 824.
[7] Ibid., p. 825.

the eye could indicate non-optical diseases was shared among these researchers. Based on this view, they further identified these non-optical diseases and their corresponding signs in the eye. The research, they argued, could improve the diagnosis of cerebral, nervous and other diseases.

At the West Riding Lunatic Asylum, Allbutt systematically distinguished between healthy 'eyegrounds' and abnormal ones. He prepared diagrammatic outlines on which detailed representations of the retina could be drawn. He grouped together patients with healthy eyegrounds and those with abnormal ones so that his students could learn how to distinguish systematically between normal and pathological states.[8] This was helpful to the preparation for his teaching at Leeds School of Medicine and for his paper 'The State of the Optic Nerves and Retina as Seen in the Insane' delivered at the Royal Medical and Chirurgical Society in 1868.[9] From 1868 to 1870, Allbutt published several papers on ophthalmic research, including 'The Ophthalmoscope in the Physicians' Practice at the Leeds Infirmary' (1867), 'Optic Nerves and Retinas of the Insane' (1868), 'Medical Ophthalmology' (1868), 'On "Optic Neuritis" as a Symptom of Diseases of the Brain and Spinal Cord' (1868), 'The Use of the Ophthalmoscope in Tubercular Meningitis and Spinal Disease' (1870) and 'Optic Neuritis in Pyaemia' (1870).[10] All these papers laid the foundation for the 1870 monograph, *On the Use of the Ophthalmoscope.*

In the preparation of the monograph, Allbutt received much help from several colleagues. In particular, Crichton-Browne supplied him with a great number of pathological specimens with descriptions.[11] Jackson was very supportive with

[8] Ibid., p. 828.
[9] Ibid., pp. 828-829.
[10] Ibid., p. 829.
[11] Ibid., p. 830.

discussions and encouragements, and Allbutt eventually dedicated the book to him.[12] Also, George Henry Lewes helped make the plates. Apart from presenting his own research in the monograph, Allbutt also discussed the work of English, French and German ophthalmologists, such as that of Jackson, Ogle, Xavier Galezowski from France, Albrecht von Graefe and Julius Sichel from Germany etc. The book began with a chapter on 'Aspect, Structure, and Connections of the Normal Optic Nerve and Retina', followed by 'Variations from Health'. It covered a wide range of studies, including a chapter on 'The Relations Between Certain Intracranial Disorders and Affections of the Optic Nerve and Retina', another on 'Ophthalmoscopic Signs of Diseases of the Spine'. There were also discussions on retinitis dependent on albuminuria, leukaemia and syphilis; on the amaurosis of diabetes and of oxaluria; on toxic amauroses. There were also a chapter on 'Effects of Disorders of the Menstrual and Other Secretions upon the Nerve and Retina' and the final chapter on 'Embolism of the Central Artery of the Retina and Its Branches'. In Allbutt's view, this monograph not only served as a useful guide to the subject for general practitioners, but also demonstrated how the instrument could be used for research purposes.

To sum up, the Leeds period is Allbutt's golden period for ophthalmic research. The notion of ophthalmic research in the present context needs further qualifications because its method, namely, the experimental method, was regarded by supporters of physiological medicine as a substitute of the anatomical method characteristic of Paris medicine. Nineteenth-century English medicine absorbed the anatomical method and physical examination from Paris medicine. English physicians of the time regarded pathological anatomy as the central part of pathology. The main role of

[12] For Allbutt and Jackson's discussions of each other's research, see, for instance, Allbutt's paper 'On "Optic Neuritis" as a Symptom of Disease of the Brain and Spinal Cord', *Medical Times and Gazette*, 1868, i: 574; and Jackson's 'Lecture on Optic Neuritis from Intracranial Disease', *Selected Writings of John Hughlings Jackson*, 2 vols, London, Hodder and Stoughton Limited, 1932, vol. 2, pp. 251 & 260.

clinical instruments such as the stethoscope was to help diagnosis. Although some of the physicians used stethoscopic findings for research purposes, what they did was to match the findings with anatomical results and therefore the main method was still the anatomical method. The main venue of disease investigation was still the 'dead-house'. In contrast, in ophthalmic research, ophthalmologists made use of the experimental method. Their object of research was the living patient and therefore the main venue of disease investigation was the clinic. Pathological anatomy was also used but its role became supplementary. This contrast indicates that the use of the experimental method in ophthalmic research was reformative in nineteenth-century English medicine. This point, I shall argue, was emphasized by Allbutt. In what follows, I discuss in detail the characteristics of the experimental method and the context in which it was employed to contrast with the anatomical method. This discussion will facilitate the understanding of Allbutt's criticism of contemporary clinical medicine.

3 The experimental method

Generally speaking, the experimental method as described in the nineteenth century included observation, hypothesis-making and experimental confirmation (and sometimes refutation and counter proof). The employment of this method in ophthalmology was nothing accidental. In this section, I argue that the application of the method, not only in physiology and medicine, but also in other emerging sciences, was a characteristic phenomenon of the second half of the nineteenth century. Allbutt's criticism of English clinical medicine and his use of this method in ophthalmic research that I shall discuss in the next section should be understood in this context.

The uses of observation, hypothesis and experiment in natural-historical or scientific inquiries had a long history. They were employed, systematically or unsystematically, by Robert Boyle, Pierre Gassendi, Charles Perrault, Francois Quesnay, Denis Diderot, and others.[13] The emphasis of such ideas in nineteenth-century medicine was largely due to the rise of experimental physiology and 'patho-physiology'.[14] Rudolf Virchow, one of the German advocates of patho-physiology, criticized the morbid-anatomical approach to the investigation of disease and emphasized the importance of hypothesis and experiment in the making of a scientific medicine. In the 'Introduction' to his collection of essays titled *Disease, Life and Man*, Virchow argued that all anatomical changes were material but not all material changes were anatomical. Some of the material changes were molecular, which would affect the functions in organisms but could not be revealed by anatomy. Functional changes, Virchow held, should be the target of medical research and should be investigated by the use of animal experiments, rather than pathological anatomy:

> Many important phenomena in the body are of a purely functional kind, and when one attempts to explain these also with a mechanistic hypothesis, in terms of fine-molecular changes, it should never be forgotten that the methods for their observation and pursuit can never be anatomical.[15]

[13] Joseph Schiller, 'The Genesis and Structure of Claude Bernard's Experimental Method', in Ronald N. Giere and Richard S. Westfall (eds), *Foundations of Scientific Method: The Nineteenth Century*, London, Indiana University Press, 1973, p. 137.

[14] Advocates of experimental physiology argued that the experimental method should be applied to both physiology and pathology and they saw the two disciplines as two sides of a coin. Hence, they called experimental pathology 'patho-physiology' or 'pathological physiology'. I will elaborate this view in chapter four.

[15] Rudolf Virchow, 'Introduction', *Disease, Life and Man: Selected Essays by Rudolf Virchow*, transl. Lelland J. Rather, Stanford, Stanford University Press, 1959, p. 17.

In another article, 'Standpoints in Scientific Medicine' (1847), Virchow held that pathological anatomy only showed the consequences of disease. It had no time dimension and did not reveal the workings of disease mechanisms in the living body. On this point Virchow posed a critical remark: If two lesions were found in a case of morbid anatomy, how to determine the causal relation of them would be a puzzling problem for anatomists:

> ...how can one decide with certainty which of two coexistent phenomena is the cause and which the effect, whether one of them is the cause at all instead of both being effects of a third cause, or even whether both are effects of two entirely unrelated causes?[16]

The lack of a time dimension and the inability to reveal causal relationship seemed a strong criticism of pathological anatomy. Such a shortcoming, in Virchow's view, disqualified pathological anatomy as a science:

> Objects which we see only in their spatial relationships are supposed to be brought into a temporal and causal relationship. Is pathological anatomy able to do this in a precise scientific manner?[17]

According to Virchow, genuine sciences, such as physics and physiology, "commence[s] with the history of material bodies", [18] and inquired "into the mechanisms and circumstances of their origin and development, into the temporal and causal interrelationships between these bodies". [19] These sciences were "concerned less with bodies as such than with processes in them".[20] Physiologists studied physiological processes and their regularities through experimentation. Such regularities or laws served as the reference for the identification of abnormal

[16] Virchow, 'Standpoints in Scientific Medicine' (1847), in ibid., p. 36.
[17] Ibid.
[18] Ibid., p. 32.
[19] Ibid.
[20] Ibid., p. 33.

phenomena. To explain morbid phenomena, physiologists would develop hypotheses based on those laws and test the hypotheses with animal experimentation. The temporal sequence and causal relation between morbid phenomena were traced out step by step. Methodically speaking, patho-physiology possessed what pathological anatomy inherently lacked: the investigations of temporal and causal relationships.

In physiological investigations, Virchow particularly emphasized the role of hypothesis and experiment. The construction of hypothesis, in Virchow's view, was the necessary mental work in scientific investigations:

> Scientific investigation proceeds therefore in the following manner: a phenomenon of general occurrence is elevated to the position of a law, and when this law is applied to things which have not yet been discovered, a hypothesis is set up. Evidence is gathered for the proof – or better, for the testing – of this hypothesis in order to find a new law. Hypothesis is thus an essential part of scientific investigation, for it represents the thinking which precede every rational action.[21]

Contrived experiment, which Virchow described as objective and specific, was the arbiter of hypotheses:

> Experiment is the final and highest court of pathological physiology, for experiment alone is equally accessible to the entire world of medicine, and experiment alone shows the specific phenomenon in its dependency on specific conditions, for these conditions are arranged by choice.[22]

In short, hypothesis and experiment were the key components of the experimental method. They were used to feature patho-physiology, as opposed to pathological

[21] Ibid.
[22] Ibid., p. 37.

anatomy. They were believed to bring medical explanations closer to those of natural sciences.

In *An Introduction to the Study of Experimental Medicine* (1865), Claude Bernard expressed a view basically similar to Virchow's. Bernard's scientific method included four steps: (1) observation, (2) hypothesis, (3) experiment, (4) observation:

> The true scientist is one whose work includes both experimental theory and experimental practice. (1) He notes a fact; (2) *à propos* of this fact, an idea is born in his mind; (3) in the light of this idea, he reasons, devises an experiment, imagines and brings to pass its material conditions; (4) from this experiment, new phenomena result which must be observed...[23]

With regard to observation, Bernard held that the use of instruments was crucial. The scientific investigator could "increase the power of his organs by means of special appliances", Bernard said.[24] Instruments of precision, he argued, could enable the scientist to "penetrate inside of bodies, to dissociate them and to study their hidden parts".[25]

Bernard emphasized that the construction of hypothesis was a very important process and must be dealt with carefully. He held that the design of experiment presupposed a question that the experimenter wanted to ask and hoped to find the answer by experimentation. Such a question or what Bernard called "preconceived idea" was the hypothesis:

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[23] Claude Bernard, *An Introduction to the Study of Experimental Medicine*, transl. Henry Copley Green, New York, Dover Publication Ltd, 1957, p. 24.
[24] Ibid., p. 5.
[25] Ibid.

> It is impossible to devise an experiment without a preconceived idea, devising an experiment, we said, is putting a question; we never conceive a question without an idea which invites an answer.[26]

Unlike Virchow who seemed to encourage experimenters to devise hypotheses only from established scientific laws, Bernard admitted that hypotheses could be "arise either *a priori* or a fact observed by chance".[27] Bernard emphasized that the use of imagination was crucial in the making of hypotheses. When making hypotheses, "we must give free rein to our imagination; the idea is the essence of all reasoning and all invention", he said.[28] However, hypotheses should fulfil two requirements: (1) No matter how imaginative they were, they "must always be based on prior observation".[29] (2) They "must be as probable as may be and must be experimentally verifiable".[30]

Apart from hypothesis-making, Bernard also discussed the nature of experimentation. He held that whereas observation was to study phenomena as given, experiment was to study contrived and altered phenomena. In an experiment, the experimenter made "natural phenomena vary, or so as to alter them with some purpose or other, and to make them present themselves in circumstances or conditions in which nature does not show them".[31] Bernard claimed that vital phenomena were less stable than physical ones. Hence, he emphasized that the experimenter should contrive a variety of experimental conditions and compare several experimental results. Through comparison, the regularity of nature could be

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[26] Ibid., p. 23.
[27] Ibid., p. 33.
[28] Ibid., p. 24.
[29] Ibid., p. 33.
[30] Ibid.
[31] Ibid., p. 15.

demonstrated. [32] Moreover, Bernard emphasized the idea of determinism. Determinism, for Bernard, was the foundation of science which could not be questioned.[33] He argued that inconsistent experimental results did not indicate that vital phenomena violated the laws of nature. Rather, they indicated the sensitivity of organic processes to altered experimental conditions. Every minute alteration of experimental conditions, Bernard claimed, would change the experimental result. Physiologists, therefore, should systematically search for the determining conditions of manifestations in the living and use the most appropriate means for controlling the conditions experimentally.[34]

Bernard's views were echoed in England. Michael Foster, who was the first Professor of Physiology at Cambridge University, agreed that the experimental method was necessary for pathological and physiological investigations. In an address in physiology delivered at a meeting of the British Medical Association in 1880, Foster remarked:

> A physiology and pathology founded on observation alone may not be impossibilities; but that progress of science which is demanded by human needs, and which at even its best is slow, is impossible without experiment.[35]

Foster wrote a biography of Bernard, in which he remarked that Bernard's success in physiological research was partly because of the latter's imaginative power:

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[32] According to Joseph Schiller, Bernard's belief in the regularity of nature was influenced by Lavoisier's demonstration of the unity of chemical laws of the living and of the inanimate; and René Descartes' mechanical philosophy. (Schiller, 'The Genesis and Structure', p. 138.)
[33] Bernard, *An Introduction to the Study of Experimental Medicine,* p. 52.
[34] Schiller, 'The Genesis and Structure', p. 142.
[35] Michael Foster, 'Address in Physiology delivered at the Meeting of the British Medical Association', *The Lancet*, 1880, ii: 288.

> But, over and above this essential condition of all successful inquiry, he [Bernard] had other prerogatives which are not often found in one man. Of these perhaps the most important was an imagination ever on the alert.[36]

Foster also explained when an experimenter could make use of his imaginative power in an experimental procedure. He held that it was in hypothesis-making and in the framing of an experiment that imagination should be applied:

> Observation starts a hypothesis, and experiment tests whether the hypothesis be true or no. Such is a research reduced to its simplest terms. The experiment once devised must be carried out in accordance with acknowledged rules and precepts; there is little or no scope here for differences in intellectual power between one inquirer and another. But in the origin of the hypothesis out of the observation, and in the framing of the experiment, there is room for all the difference between genius and stupidity or foolishness. It is in the putting forth the hypothesis that the true man of science shows the creative power which makes him and the poet brothers.[37]

Imagination and mental flexibility, Foster argued, often lead to scientific discoveries. Foster pointed out that many of Bernard's 'discoveries' were accidental, arising from 'twists' of intended experimental plans. For instance, Bernard's 'discoveries' of the vaso-motor action and the thermic influence of the sympathetic nerves resulted from a deviation from his initial experiments on the cervical sympathetic:

> All this dominant knowledge [of the vaso-motor action and thermic influence of the sympathetic nerves] has come, as does a full stream

[36] Michael Foster, *Claude Bernard*, London, T. Fisher Unwin, 1899, p. 227.
[37] Ibid., pp. 229-230.

> from the spring which is its source, from Bernard's initial experiment on the cervical sympathetic. This is one of not a few instances, in which a simple experiment on a living animal, has brought suddenly a great light in a field where men had been groping in vain with the help of mere clinical observations.[38]

As will be shown in the next section of the present chapter, Foster's view was echoed by Allbutt in the latter's appreciation of Robert Boyle's scientific method.

Originating in the physical sciences, the ideas of hypothesis and experiment spread not only into nineteenth-century physiology and medicine, but also into other natural and biological sciences. For instance, in his Presidential Address to the American Society of Naturalists in 1885, entitled 'The Inculcation of Scientific Method by Example, with an Illustration Drawn from the Quarternary Geology of Utah', Grove Karl Gilbert, Chief Geologist of the United States Geological Survey from 1889 to 1892, emphasized the important role that hypothesis played in scientific research:

> It is the province of research to discover the antecedents of phenomena. This is done with the aid of hypothesis. A phenomenon having been observed, or group of phenomena having been established by empiric classification, the investigator invents an hypothesis in explanation. He then devises and applies a test of the validity of the hypothesis. If it does not stand the test he discards it and invents a new one. If it survives the test, he proceeds at once to devise a second test, and he

[38] Ibid., p. 130.

> thus continues until he finds a hypothesis that remains unscathed after all the tests his imagination can suggest.[39]

Such a kind of experimental thinking also manifested itself in embryology. In the 1880s, Wilhelm Roux, Professor of embryology at the University of Innsbrück and later Director of the Anatomical Institute connected with the University of Halle in Prussia, launched the programme of *Entwickelungsmeckanik*, which was aimed at investigating the mechanical causes in ontogeny and introducing the corresponding method of research.[40] Roux advocated the view that all sciences, including embryology, should pass through a descriptive phrase and finally become an experimental discipline.[41] In an experimental discipline, causes and effects were studied in an analytical and highly artificial manner, by means of contrived experiments:

> The experiment is the artificial production of conditions of phenomena, the artificial combination of factors, in order to see what will happen because of them and in order to gain consequently a clarification of their influence.[42]

Roux added that hypothesis-making determined which aspect of nature an experiment would reveal. It is the 'soul' of an experiment and must be carefully conducted:

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[39] Grove Karl Gilbert, 'The Inculcation of Scientific Method by Example, with an Illustration Drawn from the Quarternary Geology of Utah', *The American Journal of Science*, 3rd ser, 1886, xxxi: 284-299. Cited in David B. Kitts, 'Grove Karl Gilbert and the Concept of "Hypothesis" in Late Nineteenth Century Geology', in *Foundations of Scientific Method: The Nineteenth Century*, London, Indiana University Press, 1973, p. 262.
[40] Frederick B. Churchill, 'Chabry, Roux, and the Experimental Method in Nineteenth-Century Embryology', *Foundations of Scientific Method: The Nineteenth Century*, London, Indiana University Press, 1973, pp. 174-175.
[41] Ibid., p. 170.
[42] *Terminologie der Entwickelungsmechanik der Tiere und Pflanzen*, Wilhelm Roux (ed), Leipzig, Wilhelm Engelmann, 1912, p. 140. Cited in ibid., p. 171.

> It is an art to so frame the question and so employ our means of coercion or the experimental conditions, that nature must answer us in a clear way. Therefore it is necessary beforehand to have gained a mental insight into the events to be researched, to have already analyzed mentally the process and at least conjecturally to have dissected it into its eventual factors in order then to prepare the conditions in which, where possible only one such factor is changed.[43]

In short, the application of an experimental method to the sciences was a growing phenomenon of the second half of the nineteenth century. Allbutt's criticism of English clinical medicine and his advocacy of the use of this method in ophthalmic research that I shall discuss in the following section should be understood in this context.

4 The cultivation of research spirit

In this section, I discuss Allbutt's criticism of English clinical medicine and his proposals for reform. In *On the Use of the Ophthalmoscope*, Allbutt criticized the English clinical method, namely, what he described as 'case-taking', for depriving medical students and clinicians of the motivation for medical research. He argued

[43] Wilhelm Roux, *Die Entwickelungsmechanik, ein Neuer Zweig der biologischen Wissenschaft*, Leipzig, Wilhelm Engelmann, 1905, p. 15. Cited in ibid., p. 172. It should be noted that, in Roux's view, there was a hierarchy of method: at the bottom of the scale, there was the descriptive method, which revealed patterns of normal development but had no explanatory power. The next one up was the comparative method exemplified by Francis M. Balfour (Cambridge lecturer in embryology and morphology; a close associate of Foster; the co-author with Foster of *The Elements of Embryology* (1874); the author of *Monograph on the Development of Elasmobranch Fishes* (4 vols., 1878) and *Treatise on Comparative Embryology* (2 vols., 1880–81). For the details of Balfour's life, see Brian K. Hall, 'Francis M. Balfour', in H. C. G. Matthew and Brian Harrison (eds), *Oxford Dictionary of National Biography: in Association with British Academy: from the Earliest Times to the Year 2000*, Oxford, Oxford University Press, 2004, pp. 523-525). The comparative method, in Roux's view, was sometimes effective in identifying causes but its inferences were not entirely reliable. (Churchill, 'Chabry, Roux, and the Experimental Method', pp. 170-171.) Above the comparative method was the descriptive experiment (*das deskriptive Experiment*), which Roux did not consider as a causal analysis proper, but regarded it as an "essential technique for clarifying some of the events in the developmental process". (Ibid.) At the top of the hierarchy stood the analytical experiment, which, in Roux's view, was causal analysis, the most advanced mode of investigation. (Ibid.)

that, apart from diagnosis, medical instruments should be used together with the experimental method to investigate diseases. This combination, in his view, could cultivate in medical students and clinicians the interest in clinical research. Such use was also a training for them to become 'investigators of disease', rather than mere practitioners.

As Allbutt conceived it, late nineteenth-century English clinical medicine, based on Thomas Sydenham's nosographical approach and the morbid anatomical tradition derived from surgeons, was empiricist and peculiar to the English. According to him, these empiricists, emphasizing utility more than explanation, followed a conventional diagnostic and therapeutic method, i.e. the case-taking method.[44] This method was widely adopted in contemporary English clinical medicine, practised by some of the elite physicians and cultivated in medical schools. In this method, experienced physicians first compiled a history of disease by means of observation and examination of the sick. Then they classified various types of disease based on signs and symptoms. A taxonomy of disease was therefore produced and it became the standard for future diagnosis. When physicians came across a new case, they would refer the patient's disorder to that generic type of disease which it more or less closely resembled and then offered the treatment which they had found useful in past cases. The method was aimed at successful therapeutics rather than explanations of disease. Its nature was utilitarian but not explanatory. Experience was regarded as the most promising and reliable basis of diagnosis and therapeutics. Theory was not of much use.

The emphasis on experience and utility and the inattention to theory and explanation in English medicine was nothing new in the late nineteenth century. In

[44] Allbutt, *On the Use of the Ophthalmoscope*, p. 4.

English medicine, there was a tradition in which physicians were proud of basing their diagnoses and therapeutics mainly on past experience. This tradition can be dated back to Thomas Sydenham in the seventeenth century.

4.1 The English clinical tradition

Sydenham claimed that he did not need a theory or system to practise medicine.[45] In his time, there was a general belief, emphasized by Galenists, that medicine should be learned and practised through a system.[46] In response to Galenists, Sydenham emphasized that his medicine was purely empiricist and non-theoretical. He asserted that one could acquire knowledge of disease only at the bedside. He further held that case histories and clinical experience were the bedrock and the justification of future treatments. As Kenneth Dewhurst points out, "independence and the repudiation of dogmatic authority were his [Sydenham's] most striking characteristics". [47] Sydenham's empiricist and apparently anti-theoretical character were much cited and emphasized by physician-historians.

The Sydenhamian tradition was preserved by nineteenth-century English medical men. The distrust of theories and the emphasis of experience were obvious among leading physicians. In the 'Introduction' to *Elements of the Practice of Medicine,* which was intended to be a handbook for medical practice, Richard Bright and Thomas Addison, two elite physicians at Guy's Hospital, acknowledged:

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[45] This claim is an exaggeration and Sydenham did indeed employ theories. For example, he employed the theory of humours and Aristotle's theory of substantial forms. Moreover, Kenneth D. Keele points out that Sydenham's explanation of the causes and mechanisms of acute and chronic diseases in terms of morbific particles was influenced by Robert Boyle's theory of corpuscles. (For details, see Kenneth D. Keele, 'The Sydenham-Boyle Theory of Morbific Particles', *Medical History*, 1974, xviii: 240-248.)

[46] Christopher Lawrence, 'Theories of Medicine', in Alan Charleskors (ed. in chief), *Encyclopaedia of the Enlightenment*, 4 vols, Oxford, Oxford University Press, 2003, vol. 3, p. 42.

[47] Kenneth Dewhurst (ed), *Dr. Thomas Sydenham: His Life and Original Writings*, London, The Wellcome Historical Medical Library, 1966, p. 33.

> The Authors feel it incumbent upon them to apologize for having in some degree deviated from their expressed intention of avoiding the introduction of theoretical discussions but it has been found almost impossible to adhere rigidly to this determination, more particularly when treating on the subject of inflammation.[48]

The reason why Bright and Addison tried to avoid theoretical discussion was that they held that the use of theory was not the best approach to the learning of medicine. The best approach was rather to portray the clinical picture and natural history of disease. In this book, Bright and Addison discussed various diseases such as fever, catarrh, influenza, pneumonia, phrenitis, hydrocephalus, peritonitis, gastritis and hepatitis. For each disease, they first discussed its characteristic features, then its predisposing cause, its exciting cause, prognosis, diagnosis and treatment. Few theories were introduced and the book appeared to be a summary of the clinical pictures of various diseases. Moreover, the authors asserted that "the student should make himself master of the minutiae and the technicalities of this most important branch of medical acquirement, by practice at the bed-side".[49] A strong sense of medical empiricism, which emphasized sagacity and skill, and disparaged theory, formed the framework of Bright and Addison's narratives.

The emphasis of the importance of clinical experience rather than theory was also pronounced in medical classrooms. Samuel Gee was supposed to have said the following to his students:

> When you enter my wards, your first duty is to forget all your physiology. Physiology is an experimental science – and a very good thing, no doubt, in its proper place. Medicine is not a science, but an

[48] Richard Bright and Thomas Addison, 'Introduction', *Elements of the Practice of Medicine*, London, Longman, Orme, Brown, Green and Longmans, 1839, vol. 1.
[49] Ibid.

empiricist art and it is as such that you may learn something of it here.[50]

Gee held that empiricism was the most promising approach to medicine. In his historical work 'Sects in Medicine', Gee categorized medical theorists into two types: Dogmatists and Sceptics. Dogmatists tended to form systems and affirmations while sceptics tended to doubt. Within these two types existed various sects. After examining different Dogmatist sects such as Methodism, Homoeopathy and Pneumatism and Empiricism, Gee pointed out that he appreciated 'the Empiric sect' most. "This is the sect towards which I myself have the most kindly feeling, being led thereto, no doubt, by the hand of nature".[51]

All this indicates that English clinical medicine was oriented mainly to curative ends. Instruments such as the stethoscope were used mainly for diagnosis. The clinic was not generally regarded as the place for research. Pathology largely meant morbid-anatomy. But in Allbutt's view, research should also be conducted in the clinic, in the living body. Medical students should be encouraged to revise received nosological standards. In other words, clinicians could be dynamic or physiological pathologists. They should carry out what later was to be called 'clinical science'.

4.2 Allbutt's criticism of the case-taking method and his argument for the use of the ophthalmoscope in general practice

From this angle, it is not difficult to understand why Allbutt criticized the case-taking method for burying medical students' research spirit (the motivation of investigating diseases with the use of instruments and the experimental method).

[50] Samuel Gee, St. Bartholomew's Hospital Report. Cited in Henry Dale, 'Scientific Method in Medical Research'. *The British Medical Journal*, 1950, ii: 1187.

[51] Samuel Gee, 'Sects in Medicine', *Auscultation and Percussion: Together with the Other Methods of Physical Examination of the Chest*, London, Smith, Elder, 1893, p. 236.

According to him, the use of case history to make nosological categories and seeing them as fixed or as a standard for future diagnosis would create an inertia for medical students: when adopting the method, medical students were encouraged to take case histories in order to learn medicine; and to compare their case histories with the established nosological standard in order to arrive at a diagnosis; in doing so, if anything in their case histories did not match the standard, they would ignore these anomalies, rather than challenge or revise the standard. This is why Allbutt said that "to compare individual instances of disease with conventional standards, is directly to *discourage* the observation of those lesser phenomena".[52] (my italics) In short, the use of the case-taking method would dogmatize the diagnostic standard, and uncritical medical students would be deprived of the scientific-investigative spirit:

> The baneful influence of this method of case-taking is but too plain in all medical schools. Students are led to think that facts which seem to them to be accessory are not only unworthy of verification, but are even intrusive, and rather spoil the elegance of their case than otherwise.[53]

In contrast to this tradition, Allbutt advocated the cultivation of a research spirit, which aimed to test and revise received nosological standards, rather than to simply follow them:

> A habit of thus wakefully regarding the minutest variations of the normal state, and of verifying them accurately, is of inestimable value, and is quite the opposite of that other habit of setting up certain morbid standards or lay-figures to which all changes are to be referred.[54]

Accordingly, medical practitioners should become more critical and prepared to make new discoveries. This change of attitude was subtle, but important:

[52] Allbutt, *On the Use of the Ophthalmoscope*, p. 4.
[53] Ibid.
[54] Ibid.

> The successful investigator must bring to test statements and conceptions which have been too long accepted on faith, habit, or good-nature. He must look boldly behind certain large words which are now too often the shelter of ignorance, and he must satisfy himself whether they have any definite value or not.[55]

To achieve this, the use of instruments of precision, such as that of the ophthalmoscope, was crucial and necessary. Allbutt argued that the ophthalmoscope was an excellent tool for clinical research because, firstly, it enabled precise observations. The instrument, he said, could reveal minute morbid changes in the eye which could be overlooked if the instrument was not employed. This would help medical practitioners to build up a habit of precise observation:

> My readers well know the marvellous change which this instrument [the ophthalmoscope] has produced in the knowledge and method of the oculist. Not only has it cleared up for him many doubts, and has enabled him to recognise certain pathological states which before were beyond his reach, but the new habits of accuracy which it has encouraged are very evident also in recent work in those departments of ophthalmic practice where the ophthalmoscope is less needed.[56]

This view was shared by John Hughlings Jackson, Allbutt's close associate in ophthalmic research. In 'Ophthalmology in its Relation to General Medicine', Jackson remarked that the use of the ophthalmoscope would train physicians to investigate diseases methodically and precisely; and to think conscientiously:

> Ophthalmic surgeons investigate their cases very methodically and very precisely. And thus, for the sake of scientific discipline, a study of

[55] Ibid., p. 5.
[56] Ibid., p. 6.

> ophthalmology is most important, even if we could make the assumption that the student would never be consulted for any sort of affection of the eyes, either alone or along with other symptoms. I do not know of any kind of work better fitted for correcting loose habits of observation and careless thinking than a study of palsies of ocular motor nerves.[57]

The second reason Allbutt regarded the ophthalmoscope as an excellent research tool was that the instrument revealed "modes of nervous change during life which before could be known only after death and in their results".[58] It allowed trained physicians "to see the commencement and progress of change in the life of nervous tissue, and to ascertain the modes and times of such change".[59] Whereas morbid anatomy showed results of disease, ophthalmoscopic observation displayed disease processes.

The ophthalmoscope was not the only instrument which could 'anatomize' the living. In nineteenth-century medicine, the invention or improvement of various instruments such as the stethoscope, the microscope, the sphygmograph, the ophthalmoscope and the laryngoscope etc, all facilitated this new kind of visual technology.[60] As is well-known, the stethoscope was invented by René-Théophile-Hyacinthe Laennec in 1819. Criticizing percussion for being inaccurate and misleading, Laennec argued that the stethoscope allowed physicians to learn about the inner structure of the living body in a precise manner. Laennec's monaural stethoscope was made of a wooden tube. It was later modified and improved by several medical men such as Nicholas Comins, Arthur Leared and S. Scott Alison.[61] By the 1890s, most stethoscope were binaural. It was also made of better sound

[57] John Hughlings Jackson, 'Ophthalmology in its Relation to General Medicine: Annual Oration Delivered before the Medical Society of London', *Selected Writings*, vol. 2, p. 301.
[58] Allbutt, *On the Use of the Ophthalmoscope*, p. 5.
[59] Ibid., p. 6.

conducting material and allowed comparisons of sound from different parts of the chest.

The laryngoscope was invented in 1857 by Johann Czermak, a Polish professor of physiology. Before Czermak, Manuel Garcia, a London singing teacher, had published an account of the motion of the vocal cords. In 1857, Czemak repeated Garcia's experiments with an instrument borrowed from the physician Ludwig Türck. Türck's instrument required sunlight to illuminate its field. Czermak refined the instrument by substituting artificial light for the glow of the sun, and using a large mirror attached to the examiner's head to reflect light into the throat. Czermak called this redesigned instrument 'the laryngoscope' and argued that it allowed physicians to observe lesions and tumours at the larynx and to diagnose disorders of the nose.[62] The laryngoscope was refined in later decades. In the 1870s inventors began to make use of electrically powered incandescent lamps. However, these lamps were heavy, expensive and generated strong heat when in use. The situation was improved in 1881 when Thomas Edison invented the carbon-filament lamp which was much brighter and generated less heat than older lamps. With Edison's lamp, a wide variety

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[60] Stanley Joel Reiser, *Medicine and the Reign of Technology*, Cambridge, Cambridge University Press, 1978, ch. 3, 4, 5.

[61] Laennec's stethoscope (the rigid stethoscope) was short and inflexible. His patients needed to change position repeatedly while being auscultated and they might need to bear the painful pressure exerted by the instrument. In 1829, Nicholas Comins, an Edinburgh physician, modified the stethoscope. He united two rigid tubes by a joint. This made the instrument able to be twisted at any angle. In the 1830s and 1840s, other monaural stethoscopes, made of pliant tubing, were introduced. They did not require the patient to change posture frequently and the pressure exerted on the patient's body was largely reduced. In 1851, Arthur Leared designed a binaural stethoscope made of a small, rigid chest piece linked with two flexible gutta-percha pipes. In the 1860s, S. Scott Alison introduced the differential stethoscope. It had two pliant tubes made of metal wire. Each tube had its own chest piece individually attached to each ear of the auscultator. This allowed the auscultator to compare sounds generated by different parts of the chest because the two hearing tubes allowed consecutive or simultaneous listening to sounds from sources. Later, David Hughes and Benjamin Ward Richardson used the latter's invented microphone to amplify heart and lung sounds. (See ibid., pp. 40-41)

[62] Ibid., p. 52.

of visual scopes for investigating different channels of the body were designed and came into use.[63]

Compared with other instruments, the microscope has a longer history. It is unclear when exactly this instrument was invented but it certainly existed in the seventeenth and eighteenth century.[64] However, its use did not flourished until the nineteenth century, after Joseph Jackson Lister, an English wine merchant, developed in 1829 a theory of combing lens to reduce aberration, which had been a strong barrier for the reception of the instrument. Microscopes equipped with Lister's lenses gained popularity in Germany, France and England and they were increasingly employed to study phlegm from the lung, blood, urine and human milk. In 1843, Guy's Hospital in London developed a microscopy department and issued periodic reports in the subject. In the 1850s, manuals for the use of the microscope became popular in the medical market. Microscopy was also advanced by the introduction of the use of stains to delineate specific structures in tissues and the employment of immersion lens which improved the quality of magnification.[65] Two important achievements in nineteenth-century medicine, namely, cellular pathology and bacteriology, would not have been made without the use of the microscope.[66]

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[63] Ibid., p. 56.

[64] There is evidence that, as early as 1620s, Cornelius Drebbel, a Dutchman and mathematical tutor to King James I of England, displayed a compound microscope in London. Marcello Malpighi, Robert Hooke and Antony van Leeuwenhoek were well-known microscopists in the seventeenth century. Using the instrument, Malpighi described the detailed structure of lungs, spleen, kidney, the development of embryos and the minute capillaries connecting arteries and veins; Hooke described cells; and van Leeuwenhoek described red-blood cells, spermatozoa and minute marine organisms. In 1687, Giovanni Bonomo, an Italian physician, detected the tiny mite responsible for a skin disorder, scabies. He argued that there was a relation between the micro-organism and this infectious disease. However, the idea that micro-organisms could be pathogenic was not further exploited in the seventeenth century. (Ibid., pp. 69-72)

[65] Ibid., p. 78.

[66] Reacting to Matthias Schleiden and Theodor Schwann's respective studies of the plant cells and animal cells in the late 1830s, Rudolf Virchow published in 1858 *Cellular Pathology*, in which he argued that new cells grow from old ones and that a disruption of cellular function was the basis of disease. With the use of the microscope, various medical scientists such as Agostino Bassi, Jacob Henle, Louis Pasteur, Joseph Lister and Robert Koch confirmed the view that infectious diseases were caused by micro-organisms. Koch's influential study of anthrax and tuberculosis, his 'Koch's

Graphical instruments were also invented in the nineteenth century. In 1847, Carl Ludwig invented the kymographion for transforming biological activities into durable curves recorded on a graph. Ludwig's kymographion was found unsuitable for measuring human pulse because such a measurement required an artery to be punctured. In 1854, Karl Vierordt invented the sphygmograph, which connected the pen and the revolving drum device in Ludwig's machine to an artery through a spring pressed on the artery. This instrument allowed non-invasive measurements of pulse. In the late nineteenth century, the sphygmograph was gradually improved and became simpler in design and more accurate.[67] Apart from the sphygmograph, electriocardiography was another remarkable invention in the nineteenth century. Augustus D. Waller, its creator, argued that alterations in the time sequence of the electric currents generated by the heartbeat could be a sign of heart disease. Although Waller's machine was difficult to use, it was refined by the Dutch physiologist Willem Einthoven. Einthoven's string galvanometer type of electrocardiograph was found very accurate and was made popular by the English physician Thomas Lewis and the American doctor James B. Herrick.[68]

The use of photography in diagnosis was another epoch-making medical technology of the nineteenth century. Photography was invented by Joseph Nicephore Niepce, Louis J. M. Daguerre, and William H. Fox Talbot. Its use in medicine provided publicly accessible records of signs which could minimize the physician's bias. In the mid-nineteenth century, surgeons and anatomists began to use photography to study bones and lesions, and hospitals began to employ photographers. Later, the development of dry-plate process and new picturing

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Postulates' and his improvement of staining and culturing techniques strongly confirmed the importance of microscopy in medicine. (Ibid., pp. 82-85)

[67] Ibid., pp. 100-101.

[68] Ibid., pp. 106-107.

techniques, such as photomicrography which allowed several observers to examine a picture of tiny objects at the same time, made photography more precise and objective diagnostic technology.[69]

It is in this atmosphere that the ophthalmoscope was invented and publicized. It has been argued that all these instruments could anatomize the living and since some of them could produce publicly accessible records they also enhanced the standard of objectivity in medical diagnosis. Whereas it was common for historians of medicine to see these instruments as advanced diagnostic tools, I argue that Allbutt emphasized their values in research. When Allbutt compared the stethoscope and the ophthalmoscope, he said:

> I confidently believe, however, that as the invention of the stethoscope has been of incalculable advantage to us, not directly only, by revealing changes of tissue during life, which previously could be but roughly guessed at, but also indirectly, by encouraging the study of diseases of the chest; so the ophthalmoscope will help us, not only by the facts it directly reveals, but by stimulating work in the direction of nervous diseases.[70]

This does not mean that Allbutt neglected the diagnostic function of the instruments. What he wanted to do was rather to inform his contemporaries and young clinicians about an unrecognized function of the instruments, and a new possible role of the clinician. In his view, the ideal clinician should also be a successful investigator equipped with the spirit of research, and the ability to use instruments and the

[69] In the early 1870s, dry-plate process was developed and it simplified the preparation of photo-taking and shortened exposure times. Eadweard Muybridge's picturing of birds and men in motion led some physicians to apply this picturing technique to study body movements caused by nervous disorders. Photography was later combined with microscopy. This new technique 'photomicrography' largely facilitated bacteriological research. (See ibid., pp. 56-57)
[70] Allbutt, *On the Use of the Ophthalmoscope*, p. 6.

experimental method. This way of looking at the clinician's role and instrumentation was not common in England in the 1870s. It made Allbutt distinctive.

4.3 Allbutt's use of history to support his medical thought

As discussed in chapter one, Allbutt was a medical historian. For the rest of this section and in the following chapters, I shall argue that he often used history to support his medical thought. With regard to his encouragement of clinical research, his portrait of Robert Boyle in his historical paper 'The Rise of the Experimental Method in Oxford' (first published in around 1910) paralleled that of 'the successful investigator' in *On the Use of the Ophthalmoscope*. In the paper, Allbutt saw Boyle as a destroyer of systems. The characteristics which Allbutt attributed to Boyle and which Allbutt appreciated most were Boyle's open-mindedness, freedom from presupposition, and his use of the experimental method. According to Allbutt, Boyle never fully committed himself to authorities. Although Boyle said that "[w]hat this or that man thought I dispute not...there are degrees of reliance on others, however great their names",[71] sometimes he found it hard to make compromises between his own observations and the views of respected authorities, such as those of Aristotle, Theophrastus and Pliny.[72] He claimed that he always kept "a bold and impartial Curiosity".[73] His motto, said Allbutt, was "[d]o not suppose but try".[74]

Allbutt emphasized that Boyle was not interested in building up an eternally valid system. Rather, he was keen on contriving various possible experiments to test hypotheses and, more important, he did the experimental work himself, published his

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[71] Clifford Allbutt, 'The Rise of the Experimental Method in Oxford', *Greek Medicine in Rome: The Fitzpatrick Lectures on the History of Medicine Delivered at the Royal College of Physicians of London in 1909-1910, with other Historical Essays*, London, Macmillan and Co. Ltd, 1921, p. 515.
[72] Ibid.
[73] Ibid.
[74] Ibid.

results and acknowledged the errors he made. This experimentalism and anti-systematizing attitude, Allbutt remarked, set Boyle apart from Francis Bacon, who pursued a set of universally valid methodological procedures, but neglected the actual experimental work:

> Both in practice and in his understanding Boyle seems to have grasped more clearly than did Francis Bacon – whose works, he tells us, he had hardly looked into lest they should prepossess him – the conception that science is advanced not by experiments but by the experimental method; and, far more clearly than Bacon, the place of hypothesis in research.[75]

This attitude also paralleled Allbutt's qualification of the successful investigator in *On the Use of the Ophthalmoscope*.

Boyle was not hostile to scientific method. What he disproved was the contemporary view that a system or a 'rational' (relative to 'empiricist') framework was sufficient and necessary for the making of scientific knowledge. This was why he opposed the notion that system building was the principal aim of science. He held that natural philosophers in his time indulged in system building and ignored the importance of experimentation. This phenomenon was detrimental to the development of science. This view Allbutt entirely agreed with. He wrote:

> Boyle says well, "It has long seemed to me one of the least impediments of the real advancement of true natural philosophy that men have been so forward to write Systems of it, and have thought themselves obliged either to be altogether silent or not to write less than an entire body of Physiology".[76]

[75] Ibid., p. 512.
[76] Allbutt did not specify the source of this quote. I cited it in ibid.

The reason why system building would hinder the progress of science was because it would restrict the freedom of thought of future inquirers. Allbutt went on:

> This practice "leads the student to suppose that the whole subject is already sufficiently explicated, and it were needless for them to put themselves to trouble and charges in making further inquiries, but thankfully to acquiesce".[77]

Obviously, this view paralleled Allbutt's complaint about the baneful influence of the case-taking method.

The ideal scientific investigator, according to Allbutt, should also pay attention to questions which appeared trivial at first glance. Boyle, Allbutt said, disdained "not to take Notice even of Ludicrous Experiments", and thought that "the 'Plays of Boys' may sometimes deserve to be the Study of Philosophers...for Nature acts very seriously, and is in very good earnest, whether we Men be so or no..."[78] Again, this curious and critical attitude paralleled Allbutt's characterization of the successful investigator in *On the Use of the Ophthalmoscope*.

Apart from Boyle's challenging and sceptical attitude, Allbutt also emphasized that the uses of hypothesis and experimentation were characteristic of Boyle's scientific investigation. In an appreciative tone, Allbutt wrote:

> On the other hand, he [Boyle] is quite clear as to the value of hypotheses, although he "cannot but represent that a hypothesis depends not upon first principles," but upon whether it stand the test of experiment or not. In contemplative moments he was wont to make lists of experiments whereby to test his ideas. He knows that "a suspension of the exercise of reason is impossible," and that it is conducive to the discovery of truth to

[77] Ibid.
[78] Ibid., p. 513.

> permit the understanding to make hypotheses, "and by its own errors to be instructed; yet such superstructures should be regarded as temporary, and to be tested with a proportionate number of experiments."[79]

In his own ophthalmic research, Allbutt also emphasized the use of the experimental method. He frequently employed the language of the experimental sciences, such as the term 'hypothesis' and 'explanatory power' in his papers. For instance, in *On the Use of the Ophthalmoscope* he wrote:

> The curious connection of amaurosis with spinal disease, and especially with locomotor ataxy, has lately attracted much interest. Some observers have endeavoured to explain the concurrence by the *hypothesis* of an irritation or palsy of mediating vaso-motor nerves; with what truth remains to be seen. In the section on encephalic tumour I have discussed the value of this *hypothesis* as offered in explanation of the optic nerve changes which accompany such growths within the skull, and I have shown to my own satisfaction that the *hypothesis* has not the *explaining power* possessed by certain other *hypotheses*.[80] (my italics)

Apart from hypothesis, Allbutt also emphasized the use of experiment. According to him, experimentation was particularly important to neurology in his time because the study of the nervous system was an area where metaphysical theories permeated easily. "[W]here the order of phenomena is most complex and observation most difficult, there our theories most readily escape the test of *experiment*" (my italics).[81] In his case studies, Allbutt often referred to the ophthalmic and ablation experiments made by Jackson, David Ferrier, Jonathan Hutchinson, Hermann Helmholtz and others.

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[79] Ibid., p. 514.
[80] Allbutt, *On the Use of the Ophthalmoscope*, p. 196.
[81] Ibid., p. 2.

To sum up, Allbutt's portrait of Boyle mirrored his characterization of the successful investigator in *On the Use of the Ophthalmoscope*. The reputation of Boyle in the history of science and the parallels between him and the successful investigator created by Allbutt suggested that Allbutt was using history to support to his own medical thought. Allbutt did not simply advocate clinical research by using such rhetoric. In *On the Use of the Ophthalmoscope* he also demonstrated how the use of the ophthalmoscope contributed substantially to the making of medical knowledge. I shall discuss this in the next section.

5 The making of medical knowledge with the use of the ophthalmoscope

The most important theme in Allbutt's monograph is that the ophthalmoscope could reveal signs of non-optical diseases, such as diseases of the nervous system, the kidneys, the liver and certain poisonings. This opened up research opportunities and Allbutt devoted a great deal of space in his monograph to the discussion of this kind of research. He also exemplified the incorporation of the use of the instrument and that of the experimental method. For instance, in the chapter, 'On the Ophthalmic Signs of Disease of the Spine', he examined the following questions: (1) "Do disturbances of the optic nerve and retina commonly follow spinal mischief?"; (2) If they follow, "then what kind of disturbances are they?"; (3) "What reason or reasons can we assign for their occurrence [the disturbances]?"[82]

For the first question, Allbutt found that disturbances of the optic nerve followed chronic, but not severe, spinal mischief. This answer was supported by his clinical observation. According to him, among thirty well-marked cases of spinal injury that he had studied, seventeen of them, which were severe injuries and proved fatal within

[82] Ibid., p. 197.

a few weeks, involved no changes in the eye. The remaining thirteen were of "chronic spinal disease following accidents of less severity".[83] Within them, Allbutt noticed eight cases of concurrent disorder in the eye. These numbers indicated that disturbances of the optic nerve follow chronic spinal mischief only.

Allbutt also referred to other kinds of cases to support his view. For instance, he held that he had examined five cases of *acute myelitis*, presumably meaning sudden onset (all in the dorsal, or upper lumbar region). Only in one of them, which became prolonged, was eye disorder found.[84] Moreover, he had examined nine cases of *chronic degenerations of the cord, exclusive of locomotor ataxy*. In five of them, there were marked changes in the eye.[85] With regard to locomotor ataxy, Allbutt said that it was agreed that eye symptoms appeared. Hence, it was reasonable to conclude that the eye disorders was associated with chronic nervous disorders. To sum up all his case studies, Allbutt noted:

(1) That changes at the back of the eye do not infrequently follow spinal disease.

(2) That these changes do not become established in the cases which run a short course, but they slowly supervene in the course of weeks or months in more chronic cases.

(3) That in spinal disease arising from injury, the higher the seat of the injury the sooner are there changes in the eye.[86]

To classify the disturbances, Allbutt held that they could be divided into two types: (1) "simple or primary atrophy of the optic nerve, sometimes accompanied at first by that slight hyperaemia and inactive proliferation which make up the state I [Allbutt]

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[83] Ibid.
[84] Ibid.
[85] Ibid., p. 198. Allbutt did not explain how he knew the diseases. It seems to be through clinical diagnoses.
[86] Ibid.

have called chronic neuritis",[87] and (2) "a somewhat characteristic hyperaemic change which I have not seen in chronic degeneration or in locomotor ataxy, but in cases of injury [as opposed to disease] to the spine only".[88]

Next, Allbutt investigated the causes of the disturbances. To begin with, he considered the 'sympathetic-nerve theory' proposed by Wharton Jones, a distinguished physiologist of his time:

> His [Jones'] argument is, that when the cord is injured, the sympathetic nerve or its origins are involved; and that, as the sympathetic nerves govern blood-vessels, and blood vessels govern nutrition, therefore the changes in the nutrition of the eye are due to [either] irritation of the sympathetic, which cuts off arterial blood from the optic nerve, or to the palsy of it, which deluges the nerve with blood.[89]

Allbutt disagreed with Jones. In Allbutt's view, "to call up the sympathetic system is to call up too potent an agency for the pressing difficulty".[90] He asked: "Are we to suppose that the irritated sympathetic causes the destruction of all connected parts; or that it starves the optic nerve by preference, while it leaves all other parts in its district unaffected"?[91] Allbutt held that although defective sympathetic nerves could affect the senses in various ways, existing case studies did not seem to support Jones' view. For instance, it had been observed that in numerous cases "there have been most obvious signs of a palsied sympathetic in the ear, face, and outer eye", and "in

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[87] Ibid., p. 199.
[88] Allbutt explained the characteristic hyperaemic change as follows: "The retinal arteries do not dilate, but become indistinguishable; while the veins begin to swell, and become somewhat dark and tortuous. The disk then becomes uniformly reddened, and its borders are lost, the redness or pinkness commencing with increased fine vascularity at the inner border, which thence so invades the white centre and the rest, that the disk is obscured, or its situation known only by the convergence of the vessels. In many cases, rather than redness, I have observed a delicate pink – pink which sometimes passes into a daffodil colour". (Ibid.)
[89] Ibid., p. 200.
[90] Ibid., p. 201
[91] Ibid.

these very cases the back of the eye has been found unchanged".[92] Allbutt said that he had also handled a case in which a young patient had "'strumous' mischief in the cervical portion of the spinal column".[93] Later, the mischief extended to the left sympathetic in the neck and the patient had in the left face "narrowed palpebral aperture, injected conjunctiva, undilatable pupil, flushed cheek and ear, and temperature of the cheek ranging from 5° to 9° above the right cheek, except during a febrile access, when this difference ceases or is diminished".[94] "In this patient", Allbutt remarked, "the symptoms of concurrent disorder of the optic nerve and retina were observed in both eyes *many weeks before* the affection of the cervical sympathetic occurred". (my italics)[95] The symptoms belonged to those of hyperaemia, the second kind of disturbance that Allbutt classified. Moreover, "there has been no change in the left disk, or in either disk, since the affection of the sympathetic."[96] All this suggested that the sympathetic was not the cause of the hyperaemia. To support his view, Allbutt also cited Jackson's case studies and the animal experiments of other workers.

In his own explanation of the disturbances, Allbutt emphasized that he was dealing with two distinct kinds of consequences of chronic nervous disorders (i.e. hyperaemia and atrophy) and it was likely that they had distinct causes. Based on his knowledge of encephalic disorders, Allbutt claimed that the hyperaemia with serous exudation following injuries of the spine (the second kind of disturbance) was very "commonly associated with meningitis or extended meningeal congestion of the base

[92] Ibid.
[93] Ibid.
[94] Ibid.
[95] Ibid.
[96] Ibid.

[of the brain]".[97] Given other observations that "injuries to the spine are very commonly followed by meningeal congestion or meningitis of a subacute character",[98] Allbutt hypothesized that "hyperaemia of the back of the eye, following injury to the spine, is probably dependent upon a greater or less [sic] extension of the meningeal and vascular irritation up to the base of the brain".[99] This view, Allbutt added, was supported by the anatomical fact that "encephalic meningitis is not an uncommon accompaniment of spinal meningitis".[100] He held that, if his hypothesis of such an 'ascending meningitis' was correct, then "the higher the injury to the spine, the sooner the affection of the vessels of the inner eye".[101]

As for the atrophy cases, Allbutt held that it was probably caused by "severance of the optic nerve fibres, sclerosis in patches, or to travelling degenerations, rather than meningitis".[102] This hypothesis, he claimed, was supported by clinical and anatomical observations. For instance, it was clinically observed "that atrophy of the disks is seen, not in recent injuries of the spine, but in slow degenerations of the cord – in cases, that is, where meningitis is usually absent or inactive" and "it is seen most frequently by far in that degeneration of the cord called sclerosis of the posterior columns.[103]

It should be noted that Allbutt had demonstrated the use of the experimental method in this case study. To explain a disease, several hypotheses might be proposed. The investigator must carefully examine them by the use of clinical

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[97] Allbutt added that "atrophy or chronic neuritis is either not associated with meningitis, or, if associated with it, is clearly due to other causes – in particular, to disease of the encephalic vessels, to degeneration of the optic fibres or centres, to disseminate sclerosis, or to severance of the continuity of the encephalic optic fibres by pressure, local neuritis, and the like". (Ibid., 205.)
[98] Ibid., p. 206.
[99] Ibid.
[100] Ibid.
[101] Ibid.
[102] Ibid.
[103] Ibid.

observations or experiments. He should not accept any hypotheses too easily and he should be aware that even accepted hypotheses can always be challenged. Equally, when he proposes an alternative hypothesis, he should make sure that the hypothesis would be supported by observations.

In the chapter, 'On the Amaurosis [104] of Diabetes', Allbutt discussed the ophthalmic signs of diabetes and argued that glycosuria was a nervous disease. According to Allbutt, cataract, atrophic and inflammatory changes at the fundus were frequently found in patients suffering from glycosuria.[105] Among other signs, atrophy of the optic disks appeared most frequently.[106] He also pointed out that Professor von Seegen of Leipzig included diminution of visual power among the symptoms of diabetes mellitus. Von Seegen's explanation was that the diminution was "a mere expression of exhaustion from innutrition".[107] Allbutt, however, disagreed with this hypothesis and argued that "the nerve atrophy is but one part of that mischief in the central nervous system which probably lies behind the disorder of the liver as a cause of glycosuria".[108] To support his view, Allbutt remarked that recent clinical and experimental observation supported the view that glycosuria was a disease of the

[104] Amaurosis was characterized in the late nineteenth century as follows: "Amaurosis – Definition. This term cannot be strictly defined. Literally, it means an obscurity of vision, a state of blindness, in the popular sense of the term, whereby nothing more is learnt than that the patient cannot see well enough for practical purposes, and is thereby unfitted for the usual occupation of life. Besides this, it is always tacitly understood that an external observation of the organ of vision [without using the ophthalmoscope], during the life of the patient, does not reveal any ostensible cause of blindness. It is further understood that the use of glasses is no remedy in amaurotic cases. It is rather the kind, than the degree, of blindness that is called amaurotic; but it must be observed that lesser degrees of blindness, of the amaurotic type, are generally, vaguely and indefinitely, called *amblyopic*. To add to the obscurity of the subject, some writers call some cases of moderate blindness, of the *amaurotic* kind, *amaurotic amblyopia*; others speak of *partial* or *incomplete amaurosis*. We now estimate any defect of vision with more accuracy, and record its area on a map, and its degree in figures, in comparison with a standard of ordinary normal vision". (original italicization) (See Richard Quain (ed) *A Dictionary of Medicine: Including General Pathology, General Therapeutics, Hygiene, and the Diseases Peculiar to Women and Children*, London, Longmans, Green and Co., 1882, p. 36.)

[105] Ibid., p. 253.

[106] Ibid.

[107] Ibid., p. 254.

[108] Ibid.

nervous system.[109] Evidence of such a view included, first, the observation that mental strain or distress, which acted upon the nervous centres, seemed to produce many cases of diabetes.[110] Second, heredity, which was assumed to have an important place in the establishment of glycosuria, was also a common cause of diseases of the nervous system.[111] Third, Allbutt had handled a case of a diabetic patient who was one of four brothers; "the three who survive him are all of peculiar nervous temperament, and one of them is actually of unsound mind. All three are still young, and will probably suffer more seriously from nervous disease".[112] Apart from these findings, Allbutt added that there were numerous cases on record of the co-existence of disease in the nervous centres with glycosuria. All this, he argued, supported the hypothesis that glycosuria was a nervous disorder in origin. The value of the ophthalmoscope as a research tool is also manifested.

Another example is the chapter 'Toxic Amaurosis'. In this chapter, Allbutt discussed amaurosis due to various kinds of poisonings. Among them, amaurosis from alcohol and tobacco poisonings were the most common. Alcohol poisoning, according to Allbutt, would lead to two kinds of amblyopia,[113] the first of which "may be due to a congestion of the choroids, with consequent pressure upon the rod layer of the retina".[114] This hypothesis was based on "the well-known tendency of alcohol to cause congestion of the blood-vessels of the head and face".[115] The amblyopia, Allbutt added, could be quickly relieved by local bleeding.[116]

[109] Although Allbutt did not mention Claude Bernard, it should be noted that, in 1849, Bernard had conducted an experiment on the induction of diabetes by puncture of the floor of the fourth ventricle.
[110] Allbutt, *On the Use of the Ophthalmoscope*, p. 254.
[111] Ibid.
[112] Ibid.
[113] For the definition of amblyopia, see ibid.
[114] Allbutt, *On the Use of the Ophthalmoscope*, p. 258.
[115] Ibid.
[116] Ibid.

The second kind of amblyopia presented the same type of congestion as in the first kind, "with consequent tissue deterioration in the optic nerves", which "causes the opacity of the pia mater and arachnoid" of the drunkard.[117] The effects of this amblyopia were not serious. Sight often remained unaffected. It might become dim sometimes but such an effect might pass unheeded as a part of the symptoms of drunkenness.[118]

With regard to the effect of tobacco on the eye, Allbutt held that it was more difficult to ascertain the effects of tobacco upon the nerves of sight than those of alcohol because first, it was hard to determine whether tobacco poisoning was the real cause of amaurosis in smokers, as the amaurosis could be caused by several other factors. For instance, smokers usually drank too. In clinical studies, it was hard to isolate smoking from drinking and other factors.[119] Second, when a person was described as a heavy smoker, unless some definite information concerning the quantity of tobacco used was given, it was difficult to make an objective causal judgment because "the standard of moderate smoking varies according to the prejudices of the physician".[120] Third, whereas ophthalmic surgeons tended to agree that smoking caused amaurosis, others held that amaurosis was rare in Constantinople, in which smoking was very common. In short, the issue was controversial and more detailed research was required for a definite conclusion.

These examples showed how the use of the ophthalmoscope stimulated medical research on the symptomatology and aetiology of some non-optical diseases. Although evidence was often inconclusive in Allbutt's time, the use of the experimental method certainly helped exclude certain untenable hypotheses and

[117] Ibid.
[118] Ibid.
[119] Ibid., p. 260.
[120] Ibid., p. 261.

preserved the most convincing ones. In short, Allbutt made claims in his monograph on the basis of experimental work of how the use of the ophthalmoscope could contribute to the making of medical knowledge. He also promoted the idea that clinical medicine should be not merely curative; but also investigative. The clinician was not only a practitioner. He could also be a researcher.

6 The clinical thermometer

Apart from the ophthalmoscope, the clinical thermometer, Allbutt argued, was also a very useful tool for disease investigations. Allbutt is the designer of the three-inch clinical thermometer that we use today. In his view, the thermometer was not only a diagnostic tool. Like the ophthalmoscope, it could also be used for research purposes. In his writings on thermometry, he often emphasized the investigative function of the instrument. In this section, I discuss the history of thermometry and Allbutt's thermometric research.

The thermometer had a long history. It is argued that Galileo was the first to invent an instrument to measure changes in temperature and Santorio Santorio the first to extensively measure the temperature of the human body.[121] In the eighteenth century, several kinds of thermometer were constructed and in around 1740 thirteen measuring scales were in use but eventually only three of them, those of Réaumur, Celsius and Fahrenheit survived to our day. The Fahrenheit thermometer was imported to Britain via Edinburgh, which had close association with Leyden in the eighteenth century. Manufacturing of clinical thermometers started in London in 1740.[122]

[121] Reiser, *Medicine and the Reign of Technology*, p. 110.
[122] Stephen Anning, 'Clifford Allbutt and the Clinical Thermometer', *The Practitioner*, 1966, cicvii: 818-820.

The eighteenth century can be regarded as the nascent stage of medical thermometry. Hermann Boerhaave persuaded the Dutch instrument maker Gabriel Daniel Fahrenheit to construct for him a special thermometer to study fever. Anton de Haen, Boerhaave's student, regarded temperature changes as a guide to therapy and argued that a return to normal temperature was a clear sign of recovery. George Martine investigated the heat of animate and inanimate bodies and James Currie made use of the thermometer to study the effects of cold and warm baths in fever.[123] However, there was resistance to the use of the instrument as a reliable diagnostic method. William Cullen, for instance, dismissed the use of it because he held that variation of body temperature was only one aspect of fever as a disease entity and the temperature changes that a patient experienced did not correlate very well with thermometer readings.[124]

Medical thermometry became more advanced and specific in the nineteenth century. In his *Lectures on General Pathology* (1841), Gabriel Andral introduced rules about temperature variation in disease. In 1844, Henri Roger published in a monograph his study of the normal temperature of children at birth and the course of temperature changes in several diseases. Around 1851, the German physician F. W. F. von Bärensprung and Ludwig Traube accepted body temperature as a diagnostic sign, and as basic a datum for predicting the course of disease and determining therapy. Carl Wunderlich published in 1857 a paper on the importance of keeping daily clinical temperature records.[125] In 1868, Wunderlich published *On the Temperature in Diseases*, in which he compiled thermometric observations on about two thousand five hundred patients and discussed temperature variations in thirty-two common

[123] Reiser, *Medicine and the Reign of Technology*, p. 113-114.
[124] William F. Bynum, 'Cullen and the Study of Fevers in Britain, 1760-1820' in William F. Bynum and Vivian Nutton (eds) *Theories of Fever From Antiquity to the Enlightenment* (Medical History, Supplement No. 1), London, Wellcome Institute for the History of Medicine, 1981, p. 138.
[125] Ibid., p. 114-115.

disorders.[126] He argued that the "alterations of temperature in disease are subject to fixed laws" [127] and demonstrated the 'typical forms' of temperature changes in various diseases, such as abdominal typhus (enteric fever), measles, pneumonia, acute rheumatism, nephritis and Bright's Disease, hepatitis and yellow fever and many others. He remarked that thermometry could show (1) the kind of disease the patient suffered from; (2) the degree of severity of the affection; (3) the passage of one stage of a disease into another; (4) the times of exacerbation and remission; (5) the development of complications; and (6) the amount of danger to the patient.[128]

Allbutt's interest in thermometry started in the early 1860s. In 1861, he was appointed Physician to the Leeds House of Recovery. Humphry Rolleston, Allbutt's biographer, remarks that Allbutt acquired remarkable insight in the diagnosis of fever disease during this appointment.[129] Allbutt's use of the 'open-air method' at the Leeds House of Recovery to treat a great number of patients afflicted during an epidemic of typhus fever in 1865-66 was remarkable and regarded as revolutionary in his time.[130] To assist the treatment, Allbutt recorded the patients' body temperature at stated times daily. This practice, Rolleston remarks, was not a routine practice in the 1860s.

Allbutt knew Wunderlich's work well and he perfectly agreed with Wunderlich that medical thermometry could make medicine more scientific. In 'Medical

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[126] Ibid., p. 116.
[127] Carl Wunderlich, *On the Temperature in Disease: A Manual of Medical Thermometry*, transl. W. Bathurst Woodman, London, The New Sydenham Society, 1871. p. 51.
[128] Ibid., p. 54.
[129] For example, according to Humphry Rolleston, there was an outbreak of a fever disease in Cambridge in 1903, whose identity was controversial at the beginning. Allbutt "rightly decided that the disease was smallpox". The disease is now known as alastrim or para-smallpox. (See Humphry Davy Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, London, Macmillan and Co. Limited, 1929. p. 22.) Moreover, in 1919, a group of naval cadets went to Cambridge to attend a course. Some of them suffered from epidemic influenza and manifested nervous symptoms. Allbutt recognized that a cerebrospinal fever had broken out. (See ibid.) Rolleston attributed Allbutt's quick and accurate diagnoses to his early working experience in Leeds.
[130] Ibid., p. 34.

Thermometry' his review article of Wunderlich's monograph, Allbutt emphasized that his own thermometric research was stimulated by Wunderlich's:

> I need not say, therefore, how much I am indebted to Dr. Wunderlich for the materials of this review; indeed, had it not been for his treatise, my article could not have been written, or could only have dealt with a small part of the subject.[131]

Wunderlich argued that the thermometer translated temperature into objective and exact numerical expressions. It minimized the subjective intervention of the physician. He added that whereas inflammation was a local sign, a change in body temperature was a sign of something wrong with the whole well-being of the organism. Furthermore, changes in body temperature indicated different phases of a disease. He summed up all these advantages as follows:

> The use of *the thermometer in disease* is, therefore, an *objective, physical method of investigation*, which gives *exact* and accurate *results*, in signs *which can be measured and expressed numerically*; which is *delicate enough to follow every step* of the changing processes of the organism, and places at the disposal of the practitioner *a phenomenon dependent upon the sum total* of the organic changes in the body. (original italicization by Wunderlich) [132]

Echoing Wunderlich, Allbutt also argued that the thermometer was "an instrument of sensitive and exact observation". [133] The instrument, he added, "determines the

[131] Clifford Allbutt, 'Medical Thermometry, Part I', *The British and Foreign Medico-Chirurgical Review*, 1870, xlv: 430.
[132] Wunderlich, *On the Temperature in Disease*, p. 48. (For a critical study of such scientific optimism in thermometry, see Chang, *Inventing Temperature*, ch. 1-4)

[133] Allbutt, 'Medical Thermometry, Part I', p. 436.

patient's state without the bias of subjective influences, and also unbiased by the prepossession of the observer".[134]

In 'Medical Thermometry', Allbutt also introduced his design of the three-inch pocket thermometer. Before Allbutt, there were two common models of thermometer in use, both designed by William Aitken in 1863. One was a straight thermometer of 25.4 cm long and maximum self-registering; the other had a curved end to fit into the axilla, 30.5 cm in its straight part, non-self-registering and to be read *in situ*. The required measuring time was about twenty to twenty-five minutes.[135] In 1867, Allbutt designed the pocket thermometer. It was at first six inches long and was finally shortened to three inches, marked with the Fahrenheit scale and intended to be kept in the axilla for five minutes. It was manufactured by Messrs. Harvey and Reynolds of 13 Briggate, Leeds; and was largely sold by Reynolds and Branson of Leeds and Hawksley of London.[136] Allbutt claimed that his pocket thermometer would make clinical thermometry a convenient and routine practice.

In his review article, Allbutt also demonstrated how the thermometer could be used for research purpose and how its use could contribute to the making of medical knowledge. For instance, he pointed out that it was well known that the temperature of the inner body was higher than that of the outer body; the temperature of the "closed cavities was from half a degree to a degree and a half higher than that of the axilla".[137] Such a phenomenon, he argued, supported the view that heat production was within the body, and heat loss was on the surface. The blood acted as an equalizer of the whole. He added that body heat was generated from various chemical processes, such as the re-combinations of aliment in the blood; and the oxidation of

[134] Ibid.
[135] Anning, 'Clifford Allbutt and the Clinical Thermometer', p. 5.
[136] Ibid., p. 7.
[137] Clifford Allbutt, 'Medical Thermometry, Part II', *The British and Foreign Medico-Chirurgical Review*, xvvi: 145.

the tissues.[138] The generated heat was eventually lost in radiation, in conduction, in evaporation, and in motion.[139]

Allbutt also discussed the application of artificial cold and warmth to the body, which were common in medical practice. He held that the effects of cold alone could be very complex. At first, the effects of cold were to reduce body temperature, but "these momentary results are soon balanced by modifications of heat development within" and eventually "the reaction may carry up the temperature beyond the starting point".[140] Hence, a short application of cold for the diminution of fever was effective. However, the duration should not be too long (Allbutt did not mention the ideal duration). The application of warmth would at first reduce the cooling process of the body. However, continuous application might cause a reduction of heat development and result in a positive depression of bodily temperature.[141] Such mechanisms of the workings of cold and warmth on the body explained why "a cold bath often warms us, while a warm one cools us to a very perceptible extent; and it must be remembered that these reactions may be more violent in morbid than in normal states".[142]

The use of the thermometer, Allbutt added, opened up new ways of thinking about the causes of changes in body temperature. For instance, it was believed that increased temperature in diseases was caused by abnormal distribution of blood. For instance, a flushed cheek following an injury to the cervical sympathetic was regarded as a result of an increased exposure of blood on the surface.[143] However, clinical thermometry showed that this kind of explanation was not always valid:

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[138] Ibid.
[139] Ibid., p. 146.
[140] Ibid., p. 147.
[141] Ibid.
[142] Ibid.
[143] Ibid., p. 151.

> But in ague, or in hectic chills, we find a rising thermometer coincident with a recession of blood from the surface, so that in this case we have to seek a different explanation.[144]

Allbutt held that the immediate causes of an increase in body temperature were heterogeneous. They could be owing to vasomotor palsies, tissue combustion or other causes. All these immediate causes, Allbutt remarked, were regulated by the nervous system:

> ...the nervous system in a complex animal gains an almost absolute command over the activities of all and sundry of its parts, and so becomes the equalizer of tension and a reservoir of force, like the fly-wheel of an engine. To say this is to say that the nervous system commands the liberation of heat.[145]

By 1870s, the view that nerves had thermic properties and that fever could be nervous in origin was no longer new. Allbutt agreed with this. The nervous system, he claimed, commanded the liberation of heat through the mediation of "the nerves, the ganglia, and centres of tension".[146] Granting that fever was a nervous phenomenon, he added that "[i]ntermittent fever, for example, as a periodic discharge of tension with disengagement of heat, may be a true parallel to epilepsy,

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[144] Ibid.

[145] Ibid., p. 154. Allbutt did not specify the meaning of the term 'tension'. However, he seemed to refer to a form of energy. Below, I summarize my interpretation of the term in Allbutt's usage: First, tension seems to be a force which can be increased or lessened and it is regulated by the nervous system. Second, it seems to hold molecules together and maintain molecular stability. If it is lessened, molecules will become less stable and molecular vibration will increase. As Allbutt said, "[l]et the external influence be excessive, that is to say, let it be an injury, and although all other organs fall into abeyance during the abnormal demand at the point affected, though we cease for the time to think, walk, digest, or make our ordinary secretions, nevertheless tension is soon lessened and molecular vibration increased throughout the system, and we see a liberation of energy as heat". (Ibid., p. 155.) Increased molecular vibration, Allbutt added, could result in fever or convulsion. Third, it seems that tension is located in all parts of the body, such as tissues and organs. (Ibid., pp. 153-155.)

[146] Ibid. p. 155.

which is a periodic manifestation of a discharge of tension in the form of motion".[147] He also suggested that medulla oblongata seemed to be the key centre for the regulation of body heat:

> It would seem rather that changes in the medulla, radiating in several or in all directions throughout the body, influence in some way the tension of the tissues by way of the nerves; in states of its activity increasing their tension and concealing heat, in states of its paresis losing hold upon them and liberating heat.[148]

It should be noted that Allbutt's expressions, such as "the equalizer of tension", "a reservoir of force", "the fly-wheel of an engine" and "discharge of tension", were based on the ideas of an engine and energy and its conservation. As Anson Rabinbach points out, with the advent of the steam and internal combustion engine, the law of the conversation of energy and the first and second laws of thermodynamics in the nineteenth century, the 'human motor' was used as a metaphor to describe the workings of human and animal bodies. It replaced the previous metaphor of the animal machine whose source of power was explained in a mysterious manner and aroused controversies.[149] The human motor metaphor featured its ability to convert one form of energy to another:

> The machine was capable of work only when powered by some external source, whereas the motor was regulated by internal, dynamic principles, converting fuel into heat, and heat into mechanical work.

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[147] Ibid.
[148] Ibid., p. 156.
[149] For instance, in Descartes' animal machine the moving power was innate, presumably invested by God. However, Julien Offray de La Mettrie held that a principle of motion was inherent in all matter and therefore he saw the human body as "essentially a watchspring with unique self-winding properties". Various views on the source of the power of the animal machine appeared irreconcilable in the eighteenth century and in 1775 the French Academy of Sciences officially refused to consider any further solutions to this issue. (See Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*, Berkeley and Los Angeles, University of California Press, 1992, p. 51.)

The body, the steam engine, and the cosmos were thus connected by a single and unbroken chain of energy.[150]

Within this perspective, nature, industry and human activities could be explained in the same way. The operations of human bodies and their power source were no more mysterious than any other things in nature and society. Using the view of the human motor, the human body was more fully naturalized.

The use of the human motor metaphor and its related ideas became common in the late nineteenth and the early twentieth century. Some contemporary scientists reasoned: if the working body was seen as a motor and if the energy loss in a motor could be minimized, then fatigue, which was regarded as the resistance to perpetual work of the human body, could also be scientifically studied and reduced.[151] In the late nineteenth century, physiologists investigated fatigue in relation to bodily movement and body heat. They designed instruments, such as the ergograph and the aesthesiometer,[152] to "register minute changes in the objective course of fatigue during any given occupation or task".[153] In the late 1870s, overwork, overexertion and fatigue were subsumed in the modern taxonomy of disorders.[154] Fatigue was contrasted with productivity, which in some social reformers' eyes, was subject to scientific investigation and could be enhanced. They held that social and political activities could conserve, deploy and expand the energies of the labouring body.[155] The language of energy and the idea of productivity were used differently in various early twentieth-century utopian social and political ideologies, such as bolshevism

[150] Ibid., p. 52.
[151] Ibid., p. 2.
[152] The ergograph is an instrument which permits firmly holding the forearm in place so that finger motions can be studied to determine how much energy is used and to show fatigue in the muscle movements. The aesthesiometer is an instrument which measures the acuteness of sense perception.
[153] Rabinbach, *The Human Motor*, p. 23.
[154] Ibid., p. 38.
[155] Ibid., p. 2.

and fascism.[156] In short, the idea of energy and its presumed properties were influential in nineteenth-century Western culture and Allbutt's use of them was consistent with his scientific-naturalistic position.

To conclude this section: Allbutt argued that the clinical thermometer was not only a useful diagnostic tool, but it also stimulated research on body heat and its relation to variations of functional balance. Like the ophthalmoscope, the thermometer opened up new areas for medical research and its use contributed to the making of medical knowledge.

7 The Historiographical Import of Allbutt's research

My study of Allbutt's ophthalmic and thermometric research has historiographical import. I claim it disconfirms Nicholas D. Jewson's apparent sharp boundary between the modes of production of medical knowledge in hospital and the laboratory. Taking up Erwin Ackerknecht's classification of bedside, hospital and laboratory medicine as successive stages in the development of medicine, Jewson introduced three medical cosmologies and specified their corresponding modes of production of medical knowledge.[157] He also regarded the three modes of production as successive stages:

> ...three distinct modes of production of medical knowledge will be identified, each of which *successively dominated* Western Europe in the period under review. These will be termed Bedside Medicine, Hospital Medicine, and Laboratory Medicine.[158] (my italics)

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[156] Ibid.
[157] John V. Pickstone, 'The Biographical and the Analytical towards a Historical Model of Science and Practice in Modern Medicine', *Medicine and Change: Historical and Sociological Studies of Medical Innovation*, Ilana Löwy (ed), Montrouge, France, John Libbey Eurotext, 1993, p. 24.
[158] Nicholas D. Jewson, 'The Disappearance of the Sick-Man from Medical Cosmology, 1770-1870', *Sociology*, 1976, x: 227.

According to Jewson, in bedside medicine, the medical investigator (in Jewson but not Allbutt's terms) was the practitioner; in hospital medicine the clinician; and in laboratory medicine the scientist. In bedside medicine, the occupational task of the medical investigator was prognosis and therapy; in hospital medicine it was diagnosis and classification; and in laboratory medicine it was analysis and explanation. In bedside medicine, the research method was speculation and inference; in hospital medicine it was statistically oriented clinical observation; and in laboratory medicine it was laboratory experiment according to scientific method.[159] (In what follows, I concentrate on hospital and laboratory medicines only because bedside medicine is not relevant to my case study of Allbutt's research.)

The period of Jewson's study was 1770-1870. According to him, laboratory medicine dominated Western European societies from around 1850s onwards: "Laboratory Medicine," said Jewson, "was first established within the German university system in the middle decades of the 19th century."[160] However, it seems more appropriate to say that England in the 1870s was dominated by hospital medicine. This is so for the following reasons: First, in his reports, *Medical Education in Europe*, published in 1912 for the Carnegie Foundation for the Advancement of Teaching, Abraham Flexner criticized English medical education for lacking a laboratory culture even then.[161] In the report, he used the term 'dead-house pathology' disparagingly to refer to contemporary English (particularly London) pathology. According to him, since most of the English medical schools (particularly those in London) were affiliated with hospitals, the pathology

[159] Jewson had a more detailed list of the differences between the three medicines. For the sake of my argument, I only list the relevant ones. For Jewson's complete characterization, see ibid., pp. 227-231.
[160] Ibid., p. 230.
[161] Flexner was also appointed as a researcher of European medical education for the Rockefeller Foundation. (For details on this appointment and the Rockefeller Foundation's philanthropic programmes, see Donald Fisher, 'The Rockefeller Foundation and the Development of Scientific Medicine in Great Britain', *Minerva*, 1978, xvi: 20-41.)

departments were restricted to post-mortem rooms.[162] Hospital pathologists were formerly junior physicians or surgeons. Their competence was restricted to morphological and histological examination. They seldom did animal experiments. Although they were teachers in medical schools, they were 'more interested in practice, on which their fame and income were based, than in scientific research or incorporating science into their teaching.[163] Pathology, in their hands, became subordinate to medicine and surgery.

Although bacteriology had been developed in England since 1870s, Flexner criticized it for being only hospital routine.[164] According to Flexner, bacteriology in England was regarded as a diagnostic aid more than a scientific discipline which could exist in its own right. (There were a few exceptions, such as the development of bacteriology in Liverpool, Manchester and Edinburgh). The laboratory staff in hospitals was small and research funding was insufficient. Hospitals and medical schools were not wealthy enough to fund research. The only organized research institute was the Lister Institute founded in 1891. Although this Institute did not have problems concerning patronage and equipment, the anti-vivisection movement in late nineteenth-century England still constituted an obstacle to its bacteriological research.[165] In short, Flexner's comments indicated that England in 1870s was dominated by hospital medicine, but not laboratory medicine as Jewson conceived.

The foundation date of the Pathology Society of Britain and Ireland ('the Pathological Society' hereafter) also confirms the above view. The Pathological Society was founded in 1906, by a group of University Professors in Pathology and

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[162] Abraham Flexner, *Medical Education in Europe: A Report to the Carnegie Foundation for the Advancement of Teaching*, New York City, The Bulletin of Carnegie Foundation for the Advancement of Teaching, 1912, Bulletin no. 6, p. 129.
[163] Ibid.
[164] Ibid., p. 138.
[165] Ibid.

prominent medical men including, for instance, German Sims Woodhead (Cambridge), William Smith Greenfield (Edinburgh), Richard Muir (Glasgow), David James Hamilton (Aberdeen), James Lorrain Smith (Manchester), James Ritchie (Oxford), Rubert William Boyce (Liverpool), Robert Fraser Calder Leith (Birmingham) John George Adami (McGill), Albert Sidney Frankau Grünbaum (Leeds), leading bacteriologists such as William Bulloch and Almroth Edward Wright, and physicians such as Allbutt and William Osler etc.[166] Regarding morbid anatomy as a very useful, but not the only, means of disease investigation, these members strongly encouraged animal experimentation, laboratory work and bacteriological research.[167]

Before the Pathological Society was founded, there had already been an established organization of pathology in London, namely, the Pathological Society of London ('the London Society' hereafter). Whereas the Pathological Society was founded mainly by professors of pathology, the London Society was founded by a group of hospital physicians.[168] The London Society was established in 1847 and its first President was Charles James Blasius Williams, who was a pupil of Laennec. Williams was a London physician and Professor of Medicine at University College. Most of the members of this society were either physicians or surgeons. Of its thirty Presidents, only one, John Burdon Sanderson, was an experimentalist. Of its one hundred and thirty members during the period 1847 to 1907, only three were not

[166] Other supporters included, for instance, leading bacteriologists, such as Sheridan Delépine, John William Henry Eyre and William Boog Leishman; specialists in tropical medicine, such as David Bruce and Patrick Manson; physicians, such as Humphry Davy Rolleston, Archibald Edward Garrod and Arthur Hall; professors in physiology, such as Noël Paton and Thomas Gregor Brodie; and veterinarians such as John McFadyean.

[167] James Henry Dible, *A History of the Pathological Society of Great Britain and Ireland*, London, Oliver and Boyd Ltd, 1957, p. 1.

[168] George J. Cunningham points out that the London Society was not the first pathological society in the United Kingdom. The first one was the Dublin Society, founded in 1838. The second one was the Reading Society founded in 1841. For details, see George J. Cunningham, *The History of British Pathology*, Bristol, White Tree Books, 1992, p. 67.

Londoners and there was only one Professor in pathology, who was Walter Hayle Walshe, Physician and Professor of Pathological Anatomy of University College.[169]

The London Society favoured a pathology based on pathological anatomy and physical examination. As Henry Dible points out, the Londoners, rooted in the morphological tradition, were slow in accepting experimentation, which to them was physically, materially, and mentally costly.[170]

After the Pathological Society was founded, the London Society merged with the Royal Society of Medicine in 1907 and became the Pathological Section of the latter. Thereafter, the Pathological Society became the leading organization in the field.[171] The foundation of the Pathological Society represented a shift from a pathology based on morbid anatomy and clinical observation to a pathology based on experimentation; from analysis of the corpse to the manipulation of the living animals; from examining the consequences of disease (lesions) to analysing the process of disease (physiological experiments) in living people and animals. It was one of the beginnings of laboratory medicine in England. If this is the case, before 1906 English pathology should have been dominated by supporters of the morbid-anatomical tradition. This implies that, contrary to Jewson's characterization, English medicine was in fact dominated by hospital medicine around 1870.

If this is the case, then Allbutt's ophthalmic and thermometric research at this time simply does not fit into Jewson's model. According to Jewson, in hospital medicine, instruments of precision were used only for diagnosis and the research method was the morbid-anatomical method:

> Diagnoses were founded upon physical examination of observable organic structures rather than verbal analysis of subjectively defined

[169] Dible, *A History of the Pathological Society*, p. 3.
[170] Ibid., p. 4.
[171] Ibid., p. 13.

sensations and feelings. This was achieved during life by means of a number of specially invented scopes and after death by means of autopsy. Pathological anatomy, indeed, became the all pervading research technique of Hospital Medicine.[172]

However, my study indicates that Allbutt, Jackson, Teale and others used the ophthalmoscope for research purpose in the 1860s. It was the research function of the instrument that Allbutt wanted to emphasize in his monograph. Allbutt's thermometric research was also conducted in the same decade. Moreover, Allbutt's research was done at the clinic but not in the dissecting room. His research objects were living patients but not corpses. Whereas Jewson held that in hospital medicine the occupational task of the medical investigator was diagnosis and classification, Allbutt was doing analysis and explanation, which was supposed by Jewson to be the occupational task in laboratory medicine.

In Jewson's view, the distinctive feature of laboratory medicine was its application of the concepts and methods of natural science:

The transformation in cosmology precipitated by this innovation [laboratory medicine] was founded upon the application of the concepts and methods of natural science to the solution of medical problem.[173]

However, Allbutt used the experimental method in his ophthalmic research and, as I have argued, Allbutt's research was done in the era of hospital medicine. All this points to the conclusion that Jewson's sharp boundary between hospital and laboratory medicines was unrealistic, at least for English medicine around 1870.

In his paper 'The Biographical and the Analytical Towards a Historical Model of Science and Practice in Modern Medicine' published in 1992, John Pickstone has

[172] Jewson, 'The Disappearance of the Sick-Man', pp. 229-230.
[173] Ibid., p. 230.

pointed out that Jewson's 'stage model' was problematic and he proposed a 'type model' as a refinement:

> I am proposing that we consider four kinds or types of medicine: biographical-bedside, analytical-hospital, experimental-laboratory, and techno-medicine...This move to (persistent) types rather than stages seems to me a useful break with much of the historiography of science and medicine, including the formulations of Acherknecht and Jewson for medicine, or indeed Kuhnian and Foucauldian formulations which, however different from each other, both seem to rule out the "persistence" of previous paradigms or epistemes.[174]

The advantage of the type model over the stage model is that "[t]ypes can be said to interact; indeed, they can be variously compounded."[175] If the type model is adopted, biographical medicine, analytical medicine and other types can co-exist at the same time without contradictions and they could interact and form new types. Pickstone argued that in the history of medicine there were cases which supported the type model. I think Pickstone's model is more realistic and preferable than Jewson's because it is consistent with my case study of Allbutt's ophthalmic and thermometric research.

8 Conclusion

In this chapter, I have argued that Allbutt attempted to make late nineteenth-century English clinical medicine an on-going research enterprise, through his own experience in ophthalmic and thermometric research. He saw that contemporary

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[174] John V. Pickstone, 'The Biographical and the Analytical towards a Historical Model of Science and Practice in Modern Medicine', p. 25.
[175] Ibid., p. 27.

clinical medicine based on the case-taking method lacked a research spirit. He argued and demonstrated that instruments such as the ophthalmoscope and the thermometer could be used with the experimental method to make new medical knowledge. Such an investigative value, I think, is overlooked in current historiographies of medical instruments. Allbutt is usually identified as Regius Professor of Physic at Cambridge, a physician and a medical historian. However, my case study in the present chapter shows that he should also be seen as an intellectual reformer of English medicine. This role is also largely overlooked. His *On the Use of the Ophthalmoscope* should not be seen as simply an introduction of the instrument. It was Allbutt's weapon in his fight to change the role of the physician from a healer to an investigator of diseases.

My study of Allbutt's reform also suggests that clear-cut historiographical boundaries such as those set up by Jewson's might bury the complexity of the development of medicine. Our seeing of historical events is shaped by the historiographical framework we adopt. Once 'anomalies' appear, we should be ready to revise our framework and we should treat any framework as a tentative and revisable tool rather than an absolute intellectual anchor.

In this chapter, I argue that Allbutt blurred the boundary between the physician and the pathologist. This is not the whole of Allbutt's project. In the next chapter, I will discuss Allbutt's protest against the division between physic and surgery and his advocacy of the hospital unit system. All this, I argue, is an attempt to break down the conventional professional boundaries in medicine and to construct a new image of the medical man as a scientific generalist.

Chapter Three

Boundary Breaking and the Making of Medical-Scientific Generalists

1 Introduction

In the last chapter, I argued that Allbutt aimed to reform clinical medicine and make it on-going research enterprise. In part this was an attempt to prevent the boundary formation that was occurring between the role of a physician and that of a pathologist and break down those that had been erected. In the present chapter, I argue that this reform is not isolated from Allbutt's life-long protest against the divorce of physic and surgery and his advocacy of the hospital unit system. All this should be regarded as Allbutt's project to cultivate young medical men as medical-scientific generalists. In Allbutt's view, the rigid division between physicians, surgeons, pathologists etc. was simply conventional. These professional boundaries prevented a physician from being a researcher; and from applying a wider range of methods to diagnosis and therapeutics. This, Allbutt considered, was a big barrier to the progress of medicine. For Allbutt, the ideal medical man should be a versatile, and should not be restricted by intellectually unjustified conventional boundaries.

In what follows, I first discuss the formation of Allbutt's surgical thinking and examine Allbutt's arguments for the unification of physic and surgery. Next, I outline the history of the hospital unit system and discuss Allbutt's support of the system with reference to his associates. Last, I discuss Allbutt's arguments for the hospital unit system.

2 The growth of Allbutt's surgical thinking and his arguments for the unification between medicine and surgery

As discussed in chapter one, Armand Trousseau's teaching and Allbutt's co-operation with Thomas Pridgin Teale at Leeds General Infirmary were important to the growth of Allbutt's surgical thinking. It is evident that Allbutt admired Trousseau's surgical skills and personality. On several occasions, Allbutt emphasized that it was his honour to be Trousseau's pupil and that he introduced Trousseau's method of paracentesis into the Leeds Hospital (even into England, as Allbutt sometimes claimed).[1] The following passage from the draft of a reminiscence of Guillaume Benjamin Amand Duchenne, describes how Trousseau introduced Duchenne to Allbutt, and illustrates Allbutt's appreciation of Trousseau's character and his reverence of this teacher:

> One summer morning in the year 1860 about 7.30 A.M., in the Hôtel-Dieu, Tuckwell of Oxford and I, pupils of Trousseau, were there awaiting the Master when, as he entered the ward with his usual punctuality, he was followed by a little, quick, vigilant man whom he introduced to us as M. le Docteur Duchenne de Boulogne. Duchenne held no office in the Hôtel-Dieu, nor I think at that time in any hospital of Paris, but Trousseau, with his invariable sympathetic welcome for colleagues of energy and talents, had discovered Duchenne and given him free clinical opportunities in his wards...Trousseau, as his manner was, especially to his English pupils, had

[1] See Humphry Davy Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, London, Macmillan and Co. Limited, 1929. p. 15, 18 & 26.

> extended to me a very kindly welcome; so quickly Duchenne and I became likewise more and more intimate friends.[2]

While Trousseau aroused Allbutt's interest and value in surgical work, Allbutt's close association with Teale consolidated Allbutt's view that medicine and surgery should not be separated. Allbutt and Teale co-operated in ophthalmic and pleuritic surgery. They also performed experiments on the hypodermic injection of morphine and carried out the operative treatment of tuberculous glands in the neck.[3] They also, Allbutt said, discovered the immunity of rabbits to morphine. However, such pharmacological experiments were halted by the Animal Experiment Act of 1876.[4] Apart from various papers on ophthalmic research, they also published in 1885 a small book *Scrofulous Neck and on the Surgery of Scrofulous Glands*, which, it is said, set forth the advantages of the universal acceptance of the operative treatment of tuberculous glands in the neck.[5]

Appreciating Teale's balanced use of reasoning and handiwork, Allbutt said that Teale "thought with his fingers".[6] In a letter of the 8th January 1925 reminiscing to Lord Moynihan of Leeds, Allbutt remarked that his Leeds period and his co-operation with Teale crystallized his conviction that medicine and surgery should not be separated:

> In those days the Staff [at Leeds General Infirmary] operated as a whole, all putting their dirty fingers into interesting wounds, and exhaling vapours from their unwashed woollen dressing-gowns! They frankly criticized each other *during* operation...My association with Teale began with ophthalmic

[2] Cited in ibid., p. 15.
[3] Ibid., p. 278.
[4] Ibid., p. 279.
[5] Ibid., p. 90.
[6] Clifford Allbutt, 'Obituary of T. Pridgin Teale', *The British Medical Journal*, 1923, ii: 1007. Cited in ibid., p. 278.

> and pleuritic surgery; as a pupil of Trousseau I returned to Leeds with views about thoracic surgery; and, as Trousseau did his own thoracic surgery, I was doing likewise; but the physicians forbade it, to my only backer's (Teale) indignation.[7]

All this indicates that Trousseau's teaching and Allbutt's close association with surgical staff, particularly Teale in the Leeds period formed the background of the his conviction that the physician's work and the surgeon's work should not be clearly divided. In some physicians' eyes, Allbutt's view might be radical and his surgical skill unappreciated. However, Allbutt regarded such resistance as prejudiced and demonstrated an unwillingness to welcome innovation. Throughout his career, Allbutt forcefully advocated the unification of medicine and surgery.

From the late 1860s until the early 1900s Allbutt persistently argued from different angles for the unification of medicine and surgery. He first protested against the rigid division in 'On "Optic Neuritis" as a Symptom of Disease of the Brain and Spinal Cord' (1868). At the beginning of the paper, Allbutt pointed out the contingency of the division:

> Two hundred years ago, when knowledge was less, divisions which, on the ground of human incapacity, were unnecessary, were then observed for reasons of caste. The Surgeon, in that degraded time of the Profession, was distinct from the Physician as a craftsman from the professor of a liberal art.[8]

Next, he alarmed the reader of the danger of continuing such a separation:

> Our present fault is not that we still recognise some partition of the realm of Medicine, but that we still hold to certain artificial boundaries with a

[7] Cited in Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 26.
[8] Clifford Allbutt, 'On "Optic Neuritis" as a Symptom of Disease of the Brain and Spinal Cord', *Medical Times and Gazette*, 1868, i: 495.

> rigidity quite opposed to the easy and natural arrangements of modern science. Our present unnatural separation of what we call "Surgery" from that which we call "Medicine" is greatly retarding our progress, not only as scientific observers, but also as Practitioners.[9]

In *On the Use of the Ophthalmoscope*, he voiced his charge against the conventional boundary-building again. In the monograph, he remarked that in English medicine there was an "unlucky division of cases between the physician and the ophthalmic surgeon":[10] This division limited medical practitioners' scope of diagnosis. As a result, important pathological facts might be overlooked:

> If the disturbance of sight be that which most affects the patient, he goes the round of the ophthalmic hospitals; if, on the contrary, the disturbance of the neuro-muscular functions be uppermost, he falls under the care of physicians, who are naturally prone to overlook any changes of the inner eye. As marked changes may occur at the back of the eye with slight or with no disorder of the visual function, it is not surprising that the physician should overlook one half of the facts, and it as naturally happens, on the other side, that the surgeon's attention is equally limited.[11]

To remedy the situation, Allbutt suggested that physicians should frequently visit ophthalmic hospitals to explore this reservoir of pathological facts and to acquire the investigative spirit from the ophthalmic surgeons:

> While the present absurd division of the profession into *operators and non-operators* continues, we must be content to urge upon those

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[9] Ibid.
[10] Clifford Allbutt, *On the Use of the Ophthalmoscope in Diseases of the Nervous System and of The Kidneys; also in Certain Other General Disorders*, London, Macmillan, 1871, p. 8.
[11] Ibid.

> physicians who take an interest in nervous diseases to frequent the ophthalmic hospitals, where a wealth of material awaits them, of which they have little conception...Indeed, physicians have little idea how 'medical' are the 'Ophthalmic Hospital Reports' and the 'Ophthalmic Review;' and to the medical work of ophthalmic surgeons like Mr. Hulke, Mr. Hutchinson, and others...I wish I could say that the physicians showed a greater sense of their obligations.[12] (my italics)

Allbutt's use of the terms "operators and non-operators" echoed his previous description in 'On "Optical Neuritis"' of a surgeon as a "craftsman" and a physician as a "professor of a liberal art".[13] Such a dichotomy between 'head' and 'hand' in fact has a long history and could be dated back to Hippocrates.[14] In the Elizabethan age, some physicians saw themselves as scholars, presented themselves as gentlemen and distanced themselves from manual labour.[15] Such a situation continued in the seventeenth and the eighteenth centuries. As Stanley Joel Reiser points out, physicians of the time who engaged in manual activities were criticized "on the assumption that the dignity of medicine could be assured only by a preoccupation with universal ideas".[16] Hence, the physicians "generally left manual activities to others: the preparation of drugs to apothecaries, therapy involving cutting and manipulation to barbers and surgeons".[17] Although Paris medicine introduced the surgical approach towards diseases into the theory of Western medicine and it became common for nineteenth-century English physicians to conduct physical examination

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[12] Ibid., pp. 8-9.
[13] Allbutt, 'On "Optic Neuritis"', p. 495.
[14] Christopher Lawrence, 'Medical Minds, Surgical Bodies: Corporeality and the Doctors', in *Science Incarnate-Historical Embodiments of Natural Knowledge*, Steven Shapin and Christopher Lawrence (eds), Chicago and London, The University of Chicago Press, 1998, p. 160.
[15] Ibid., p. 164.
[16] Charles Talbot, 'Medical Education in the Middle Ages,' in C. D. O'Malley (ed), *The History of Medical Education*, Berkeley, University of California Press, 1970, p. 78. Cited in Stanley Joel Reiser, *Medicine and the Reign of Technology*, Cambridge, Cambridge University Press, 1978, p. 13.
[17] Ibid.

and pathological anatomy, some still disparaged surgical work. As Christopher Lawrence points out, these physicians regarded themselves as being engaged in a gentlemanly profession: they held that only "the gentleman, broadly educated, and soundly read in the classics, could be equipped for the practice of medicine".[18] They still regarded surgeons as inferior and they did not apply much surgical skill in their daily practice. However, Allbutt saw such a 'hierarchy' as a prejudice and from a scientific point of view the distinction was only impeding the advance of medicine.

In his later writings, Allbutt argued in more detail for the unification of medicine and surgery. For instance, in 1882, he delivered an address, 'On the Surgical Aids to Medicine', in which he explained to general practitioners how surgery was necessary for the therapeutics of a number of diseases and how the use of craft skills would help the practitioners to treat patients more efficiently. One of the diseases he discussed was scrofula. The disease, he said, was one in which the physician alone (without the surgeon's help) would feel impotent. The physician might prescribe cod-liver oil and recommend sea-air but such remedies did not really cure the disease.[19] The true therapy, Allbutt held, lay in surgical interference. According to Allbutt, the so-called suppurating glands under the jaw (a sign of scrofula) were in fact subcutaneous secondary abscesses. The abscesses should be "freely laid open under ether, and the sinus or sinuses leading inward must be probed".[20] Moreover, the physician would usually find a caseous gland hidden behind the sterno-mastoid muscle. This, Allbutt said, "must be reached and scooped out, and all the enlarged glands discovered, scooped and cleared of their decaying elements".[21] All this was surgical treatment.

[18] Christopher Lawrence, 'Incommunicable Knowledge: Science, Technology and the Clinical Art in Britain 1850-1914', *Journal of Contemporary History*, SAGE, London, Beverly Hills and New Delhi, 1985, xx: 505.
[19] Clifford Allbutt. 'On the Surgical Aids to Medicine', *The British Medical Journal*, 1882, i: 2.
[20] Ibid.
[21] Ibid.

Allbutt added that Teale had worked on such a plan in a number of cases and the results were excellent, in respect of permanent local cure, of rapidly restored health, and of avoidance of disfigurement.[22] Allbutt suggested that subclavian, auxiliary and other scrofulas should be treated in the same way.

Another example was feeding children who had diseases of the throat. The physician, Allbutt claimed, would find it very difficult to complete such a task. Allbutt held that, however, by surgical skill, he had successfully fed a child suffering from scarlatina anginosa. The technique was to push "an India-rubber teat, connected with an elastic ball, into the nostril, and gently squeezing liquid food into the throat *per nares*".[23] Allbutt added that in a case that he and Charles Smith of Halifax attended together, Smith improved the feeding method when Allbutt's usual strategy was a failure:

> He [Smith] filled one of the long fine rubber tubes sold with Southey's trocars, with milk from a cup in which one end of the tube was sunk. At each time of feeding, the other end was quickly and easily threaded up the nostril and so into the throat, and by raising or lowering the cup the food ran by drops at the will of the operator into the patient's gullet.[24]

On the improved method, Allbutt remarked that he had "no hesitation in saying that this manoeuvre saved the little one's life".[25] This case showed that it was desirable for physicians to possess some surgical skills.

Surgical skills were not only valuable in therapeutics, but were also of use in diagnosis. Aspiration, Allbutt argued, was essential for the diagnosis of many lung and liver diseases. "To distinguish fluid and solid gatherings in the chest is at times

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[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] Ibid.

impossible without the needle", Allbutt said, "and the same is true of like difficulties in the liver and elsewhere".[26] Moreover, Allbutt claimed that the use of the forefinger, whose brilliant functions physicians always neglected, was crucial to the diagnosis of rectal diseases:

> Rectal diseases often stimulate maladies which belong to the sphere of the physician, such as irritable bladder or uterus, diarrhoea, lumbago, sciatica and the like; and sad are the oversights of the physician who is not ready with that handy little instrument, the forefinger.[27]

Allbutt also discussed the use of surgical skill in diseases of the pleura, the stomach and other organs. With all these examples, he concluded that physicians should equip themselves with minor surgical skills and a surgical mind. That is to say, they should use their imagination to create new surgical methods to fit individual needs.

Allbutt's emphasis on the importance of the unification of medicine and surgery was evident when he delivered 'The Historical Relations of Medicine and Surgery' in 1904 at the Congress of Arts and Sciences in connection with the World's Fair and Exposition at St. Louis, Missouri. The Congress, organized by Hugo Münsterberg, Professor of Psychology at Harvard, consisted of twenty-four departments. The department of medicine, chaired by Willliam Osler, was made up of twelve sections and Allbutt delivered the address in the Section of Internal Medicine.[28] In the address, Allbutt used the historical approach. He began by claiming that Hippocrates was "in genius perhaps the greatest physician of all past time" because he was both a physician and a surgeon; and his writing had commanded the admiration of such men

[26] Ibid., p. 3.
[27] Ibid.
[28] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 165.

as Joseph Pierre Elénor Pétrequin, Jean-François Malgaigne, and Emile Littré.[29] The Greek physician, Allbutt held, "had no more scruple in using his hands in the service of his brains [sic] than had Pheidias or Archimedes".[30]

Allbutt added that after Hippocrates, surgery was advanced by Celsus. "In Celsus we find that the surgical and the obstetrical sides of it [medicine] had made further substantial progress", said Allbutt.[31] Galen, Allbutt noted, did not make any great mark on surgery. However, his surgical method was "adopted in the main from the Alexandrians and from Soranus" and there was no hint that he "fell into the mediaeval abyss of regarding surgery as unfit for a scholar and gentleman".[32]

This remark about gentility was interesting because, in medieval times, there were no gentlemen in the Victorian sense. The idea of Victorian gentleman was complex but could include a scholar, who was learned in classics and was distanced from manual affairs. This idea of gentility is well explicated by Gert H. Brieger in 'Classics and Character: Medicine and Gentility'. According to Brieger, the nineteenth-century gentleman was expected to receive a liberal and classical education; and possess sound morals and display intellectual distinction.[33] For some, 'good breeding' was also an important idea of the gentlemanly culture.[34] The social expectation of a Victorian gentleman was that he was someone whose family could afford for him a classical and liberal education; that he was someone who used his intellectual power to earn a living or lived from family inheritance, such as land, rather than physical work. A Victorian gentleman was not supposed to labour and therefore he was not

[29] Clifford Allbutt, 'The Historical Relations between Surgery and Medicine', *The Lancet*, 1904, ii: 935.
[30] Ibid.
[31] Ibid.
[32] Ibid.
[33] Gert H. Brieger, 'Classics and Character: Medicine and Gentility', *The Bulletin of the History of Medicine*, Baltimore, The Johns Hopkins University Press, 1991, lxv: 94-95.
[34] Ibid., p. 95.

expected to engage in much handiwork. Hence, there was a subtle incompatibility between gentility and handiwork. Whereas medieval gentlemen had a code of chivalry, behaviour and manners, they were not gentlemen in the Victorian sense.

The Victorian gentleman physician was supposed to have a good knowledge of languages, particularly of Latin, which was the symbol of academic ability.[35] He should be able to read the classics in the original. He should read widely in history, philosophy, literature and general science. He should possess mental qualities, such as compassion, integrity, imagination and a capacity for decision-making.[36] He was distinguished from a surgeon, who was generally regarded as inferior and the essence of whose business was handiwork.[37] This is partly why nineteenth-century English elite physicians who regarded themselves as gentlemen disparaged surgical work.

Allbutt was opposed to this idea. He held that there was no inconsistency between gentility and surgical work. In the remark that Galen did not fall "into the medieval abyss of regarding surgery as unfit for a scholar and gentleman", Allbutt was trying to make surgeon's handiwork appropriate for a Victorian gentleman by infusing Victorian gentility into medieval history. This is a delicate use of rhetoric to integrate surgical work into gentlemanly culture. In doing so, Allbutt aimed to create an idea of a gentleman who performed handiwork.

In his discussion of twelfth-century medicine in 'The Historical Relations', Allbutt remarked that twelfth-century medicine shrank "not into sterility only but into degradation".[38] The discipline of practical surgery declined. Such a situation continued in the thirteenth and fourteenth centuries. During this period, "surgery,

[35] Ibid., p. 105.
[36] Ibid., pp. 94-96.
[37] A number of late nineteenth-century English surgeons, such as Joseph Lister, were knighted. This was because they were exceptionally outstanding. The ordinary surgeons, however, were still inferior in elite physicians' eyes.
[38] Allbutt, 'The Historical Relations', p. 935.

hated and avoided by medical faculties, scorned in clerical and feudal circles, began in the hands of lowly and unlettered men to grow from a vigorous root".[39] Surgical advances were made in Italy, France and Germany from the thirteenth to the sixteenth century. Despite this, the dogmatism of Galen's treatises, the construction of speculative systems, and the trust of universal ideas rather than experience, all of which Allbutt summed up as "false pride and conceit", were influential and created a cleavage between medicine and surgery.[40] As a result, handicraft lost its place in medicine:

> ...the physician lost not only or chiefly a potent means of treatment, he lost thereby a method; he lost touch with things, he deprived his brains of the cooperation of the subtlest machine in the world – the human hand.[41]

The university in the sixteenth century, Allbutt added, "is prone to make of education thought without hands; the technical school hands without thought".[42] Such a situation, he considered, had continued in nineteenth-century England.

According to Allbutt, the unjustified divorce between medicine and surgery could be remedied by cultivating an all-round training for medical students. In this training, "the sciences must be taught whereby the crafts are interpreted, economised, and developed".[43] Craft and thought should be equally treated and passed on to medical students. "That for the progress and advantage of knowledge the polar activities of sense and thought should find a fair balance is eminent in great examples of mankind", remarked Allbutt.[44] Such an all-round training, I think, was more fully

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[39] Ibid., pp. 935-936.
[40] Ibid., p. 938.
[41] Ibid.
[42] Ibid.
[43] Ibid.
[44] Ibid.

institutionalized in the 1920s, in the form of hospital units, of which Allbutt was an enthusiastic advocate.

3 The hospital unit system and Allbutt's association with the medical sciences

While the unification of medicine and surgery implies a boundary breaking between the physician and the surgeon, the hospital unit system implies a break of more conventional boundaries, such as that between the clinicians and the life scientists. The hospital unit system was aimed to train medical-scientific generalists, the ideal medical men in Allbutt's view. In this section, I outline the development of this system. I also discuss Allbutt's association with Michael Foster, Alfredo Antunes Kanthack, German Sims Woodhead and his involvement in the Medical Research Committee. This discussion would explain how Allbutt in the 'post-Leeds' period maintained his generalist view of medicine. Such maintenance would explain why he supported the hospital unit system. Last, I discuss William Osler's precursory advocacy of the hospital unit system in England.

The hospital unit system as described by its supporters was intended to combine research and teaching. Under this system, a hospital would contain several units. Each unit would be responsible for one service. For instance, there were to be surgical units, ophthalmic units, obstetric and gynaecological units. A full-time Director would be appointed for each unit. This Director was also to be Professor of the respective department in the medical school.[45] The formation of hospital units was regarded as a way to affiliate hospitals with universities. Under the unit system, medical students, in their five-year medical curriculum, would have an opportunity to practice in several units. In each unit, they would work under a Director, from whom

[45] A. McGehee Harvey, Gert H. Brieger, Susan L. Abrams, and Victor A. Mckusick, *A Model of Its Kind: A Centennial History of Medicine at Johns Hopkins*, 2 vols, Baltimore, The Johns Hopkins University Press, 1989, vol. 1, p. 22.

they would learn diagnostic and therapeutic skills, scientific thinking, research methods and laboratory techniques. They would have intensive practice in surgical techniques, laboratory work and the use of instruments of precision. This kind of training was consistent with Allbutt's ideal medical man. In a sense, the hospital unit system provided a generalistic training as opposed to early specialization. Under the system, medical students were to be equipped with the knowledge of physic, surgery, gynaecology, pathology and other medical sciences. They were expected to be medical-scientific generalists.

The implementation of the hospital unit system in England largely followed the Haldane Commission's investigation of the working and the organization of the University of London in 1909. With respect to medical education, the Commission concluded that English medical education seriously lacked a laboratory-scientific culture. In his report to the Carnegie Foundation, *Medical Education in Europe*, Abraham Flexner, one of the advisors of the Commission and also an advisor of the Rockefeller Foundation, remarked that clinical education in English medical schools (particularly those in London) was controlled by consultant physicians and surgeons, who were more interested in practice, on which their fame and income was based, than in scientific research and incorporating science into their teaching.[46] Their competence was restricted to morphological and histological examinations and they seldom did animal experiments.[47] With reference to the Johns Hopkins experience, the Commission decided in 1913 that hospital units should be introduced to the University of London.[48] However, the First World War delayed the plan. After the

[46] Abraham Flexner, *Medical Education in Europe: A Report to the Carnegie Foundation for the Advancement of Teaching*, New York City, The Bulletin of Carnegie Foundation for the Advancement of Teaching, no. 6, 1912, p. 35.
[47] Ibid.
[48] See O. L. Wade, 'The Legacy of Richard Burdon Haldane: The University Clinical Units and their Future', *Ulster Medical Journal*, 1976, xlv (part 2): 146-156. Also, according to A. McGehee Harvey,

War, the establishment of scientific medical teaching, first at London medical colleges, all of which were part of the University of London, and later extended to provincial universities, was promoted by the Medical Research Committee (MRC), which became a Council after 1920.[49] In the 1920s, the project received further financial support from the Rockefeller Foundation.[50]

Gert H. Brieger, Susan L. Abrams, and Victor A. Mckusick, the Johns Hopkins Hospital, opened in 1889, was the first hospital in America (also the first in an English-speaking country) to enforce the hospital unit system. The idea of the hospital unit originated in Germany and was introduced into the English speaking world by Daniel Coit Gilman, the first President of the Johns Hopkins University founded in 1876. Before taking up the presidency at Johns Hopkins, Gilman had been the President of the University of California for the previous four years. He had visited the University of Berlin in the mid-1850s and introduced into Johns Hopkins some policies enforced in Berlin. The policies included the appointment of professors as researchers; a fair distribution of the professors' workload of teaching and research; and the encouragement of the unit staff to publish their research. Gilman regarded the medical school and the hospital as part of the university. Research and postgraduate studies were the emphases of the medical school. The Americans saw Johns Hopkins University and its Hospital as the beginning of scientific medicine in America and they were proud of the hospital unit system.

[49] In 1916, the MRC started introducing research and teaching components to London hospitals. The cardiographic department directed by Thomas Lewis at University College Hospital was the first unit which combined research and teaching in an English hospital. (See *Annual Report of the Medical Research Committee*, London: H.M.S.O., 1919-1920, p. 29.) In 1919, the MRC pleaded for funding from the Board of Education to establish hospital units in a number of hospitals in London. The hospitals included St. Bartholomew's Hospital, the London Hospital and St. Thomas' Hospital.

[50] The Rockefeller Foundation was established by John. D. Rockefeller, a fabulously rich oil magnate, in the early twentieth century. Its policy was constituted by Rockefeller's assistant, Frederick T. Gates. The Foundation ran philanthropic programmes with the aim of promoting the inclusion of pre-clinical scientific subjects in medical curricula and to incorporate experimental research in medical practice. (See Donald Fisher, 'The Rockefeller Foundation and the Development of Scientific Medicine in Great Britain', *Minerva*, 1978, xvi: 21.) Rockefeller was deeply inspired by the scientific teaching of the Johns Hopkins University Medical School. (Ibid.) Echoing the emphasis on laboratory work in medicine, Rockefeller founded the Rockefeller Institute for Medical Research in 1901 and supported various medical research and services in America. Moreover, he also wanted to promote medical research and the teaching of scientific medicine in other countries. To do so, the Foundation developed an international philanthropic project, of which London was one of the targets. Upon Gates' request, Flexner tailored a report for the project in 1911. The corresponding funding policy of the Foundation towards British medical education was based on this report.

From 1920 to 1923, the Foundation generously funded the hospital units at University College Hospital as a means to unify University College London, University College Medical School and University College Hospital. Richard M. Pearce, a Rockefeller Foundation official, had a close association with Walter Morley Fletcher, the Secretary of the MRC. They aimed to cultivate the hospital unit system throughout Britain. (Ibid., p. 31.) Fletcher also convinced the Dunn Trustees to financially support the establishment of hospital units at St. Bartholomew's and St. Thomas' Hospitals; and the enlargement of the existing unit at London Hospital. (Ibid., p. 32.) In 1926 and 1927, the hospital unit system was extended to the University of Cardiff and a surgical unit was opened in Edinburgh University with the benefaction of the Rockefeller Foundation. In the same year, the Foundation also opened an obstetrics unit at the University College Hospital Medical School, in addition to the medical and surgical units established by the MRC in the late 1910s. In 1929, the Foundation created the London School of Hygiene and Tropical Medicine, as part of the University of London. (Ibid., p. 27.) Other benefactions of the Foundation included the grants for the department of experimental medicine at Cambridge University and its pathological research; and the development of the Rockefeller Fellowship.

The hospital unit system was intended to unify the basic sciences and their methods with clinical studies. Its supporters were those who appreciated preclinical sciences and Allbutt was one of them. As discussed, Allbutt research-oriented clinical thinking and his privileging of the experimental method were crystallized in the Leed's period. He continued to hold these views in his later career. This is evident in his associations with preclinical scientists. These associations fit closely with his advocacy of the hospital unit system.

Allbutt was appointed Regius Professor of Physic at Cambridge in 1892. Thereafter he became closely associated with Michael Foster and other experimental pathologists. Foster was an influential figure, not only in Cambridge physiology, but also in Cambridge medicine. He expanded the curriculum of medical teaching at Cambridge and introduced into the 1st M. B. elementary biology, a course modelled on Thomas Henry Huxley's biology courses at the Royal School of Mines, in which he had been Huxley's assistant. Foster was one of the founders of the clinical school at Cambridge in the mid-1880s. He was also a member of the Special Board for Medicine, which was the most influential group responsible for the direction of medicine within Cambridge University.[51]

The Allbutt-Foster association did not manifest much in academic research. Rather, it manifested itself in Foster's continuous support of Allbutt's teaching. For instance, Foster was a force in dissolving the hostility of the Addenbrooke's staff to Allbutt. The Regius Professorship was usually offered to a member of the staff of Addenbrooke's Hospital. However, Allbutt's appointment was an exception. When he was appointed at the university, he had no official appointment at the hospital. Nor did he reside in Cambridge. It is said that the success of his appointment, being a

[51] Mark Weatherall, *Gentlemen, Scientists and Doctors: Medicine at Cambridge 1800-1940*, Woodbridge, Rochester and New York, The Boydell Press, 2000, p. 132-133.

departure from Cambridge custom, was largely due to Foster's endorsement.[52] After appointed at Cambridge, Allbutt was still rebuffed by some senior clinicians for several reasons: First, Allbutt was an 'outsider', but was preferred over Cambridge local candidates including Donald MacAlister, John Bradbury and Peter Wallwork Latham for the appointment of the Regius Professorship. This triumph was a source of jealousy.[53] Second, since clinicians such as George Paget and Latham distrusted physiology,[54] Allbutt's physiological-minded character and Foster's support of him led to antagonism by the clinicians. Third, the establishment of the Special Board of Medicine was part of the university policy to shift power from the clinicians to the preclinical scientists.[55] Allbutt's close association with Foster, who was a member of the Board, intensified the clinician's hostility towards him. As a result, Allbutt had to depend on "the goodwill of the hospital physicians for access to the wards for teaching purposes."[56] Latham, it was said, had claimed that Allbutt would enter the wards of Addenbrooke's Hospital over his dead body.[57] This situation was a big obstacle to Allbutt's teaching and was pointed out in *The British Medical Journal* in 1895:

[52] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 109.
[53] Peter Wallwork Latham, Donald MacAlister and John Bradbury were Physicians to the Addenbrooke's and were strong candidates for the Regius Professorship of Physic. All of them opposed the appointment of an 'outsider' and Latham, being Senior Physician and Downing Professor of Medicine, thought that he had a high chance. However, it turned out that the university chose Allbutt. This set up the Addenbrooke's physicians' hostility towards the 'outsider' Regius Professor. (For more details of the conflicts between the Addenbrooke's and Cambridge Medical School, see Weatherall, *Gentlemen, Scientists and Doctors*, pp. 187-192.)
[54] Ibid., p. 134.
[55] Ibid., p. 133.
[56] Ibid., p. 187.
[57] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 111.
Latham was antagonistic towards Allbutt because he, Donald MacAlister and John Bradbury, all being Physicians to the Addenbrooke's, were strong candidates for the Regius Professorship. All of them opposed the appointment of an 'outsider' and Latham, being Senior Physician and Downing Professor of Medicine, thought that he had a high chance. However, it turned out that the university chose Allbutt. This, in addition to Latham's distrust of physiology and Allbutt's association with Foster, set up his hostility towards this 'outsider' Regius Professor. (For more details of the conflicts between the Addenbrooke's and Cambridge Medical School, see Weatherall, *Gentlemen, Scientists and Doctors*, pp. 187-192.)

> Professor Clifford Allbutt has been in a position that would be a difficult one for most men, namely, that of having to make bricks without straw. How can a clinical physician teach without cases or wards to draw from? Cambridge thus loses the benefit of Professor Clifford Allbutt's extensive practical experience and knowledge of medicine.[58]

Foster considered this situation a most unsatisfactory state of affairs.[59] Even worse, in 1893, John Bradbury suggested the establishment of a Chair of clinical medicine, "whose incumbent would have the task of directing clinical teaching."[60] Being Physician to Addenbrooke's, Bradbury added that he was willing to take the position without stipend. If this proposal was accepted, Allbutt's situation would be made more difficult because his duty of clinical teaching would have been taken by this new professor. To save Allbutt from such a difficult situation, Foster moved an amendment in the Special Board of Medicine that the proposal be deferred "until after the unsatisfactory relations between the university and the hospital had been solved."[61] The amendment was passed and it "included a clause calling for a memorandum to be sent to the vice-chancellor pointing out Allbutt's situation."[62] In this way, Allbutt's trouble was dissolved. In fact, the struggle for Allbutt to teach at Addenbrooke's hospital was long lasting because it necessitated a change in the influence of the university over the hospital. Allbutt was not appointed Physician to the hospital until 1900, when Latham had vacated his position.

Apart from Foster, Allbutt also had close association with Cambridge Professors of Pathology such as Alfredo Antunes Kanthack and German Sims Woodhead.

[58] Cited in Weatherall, *Gentlemen, Scientists and Doctors*, p. 187.
[59] Ibid., p. 188.
[60] Ibid.
[61] Ibid.
[62] Ibid., p.189.

Succeeding Charles Smart Roy in 1897, Kanthack became the second Professor of Pathology at Cambridge. Kanthack had a strong background in experimental pathology. Before joining Cambridge, he was Director of the Department of Pathology at St. Bartholomew's hospital. Much of his work was devoted to bacteriology and immunity and therefore the establishment of a laboratory at Cambridge was one of his major concerns. During his appointment at Cambridge, Kanthack and Allbutt tried to set up a small clinical laboratory at Addenbrooke's hospital. The plan was thwarted, partly because the University regarded it as an intrusion of its teaching method and partly because the governors of the hospital were not willing to take in patients suffering from infectious diseases.[63] Despite this, the plan, together with Kanthack's contribution of the article, 'The General Pathology of Infection', in the first volume of *A System of Medicine* indicates a close association between Allbutt and Kanthack.

Kanthack died young, at the age of thirty-five. He was succeeded by German Sims Woodhead. Like Kanthack, Woodhead also formed a close association with Allbutt. Together they realized the construction of a new medical school at Cambridge from a plan proposed in 1896 by Allbutt, Foster, George Humphry and Donald MacAlister. In fact, in the late 1890s, Cambridge University was facing a funding crisis. The medical school was taking in more students. However, the student fees could not cover the corresponding increasing costs in staff, buildings, appliances and teaching material.[64] Allbutt tried hard to raise funds for a new medical school building but the amount of money obtained was far from satisfactory. Much more money from the University was allocated to other departments such as the department of Physics and the department of Law. With such limited funding, Woodhead suggested that the

[63] Ibid., pp. 153-154.
[64] Ibid., p. 156.

improvement of the building and facilities should be done gradually and the construction programme should be broken down into three phrases. His suggestion was accepted and Allbutt continued the fund raising. Finally, in 1904, all the new buildings were completed and were opened by the King and Queen.[65]

Both Allbutt and Woodhead were keen on clinical pathology. Having failed to set up a clinical laboratory at Addenbrooke's Hospital with Kanthack, Allbutt co-operated with Laurence Humphry and they jointly paid one hundred pounds per annum to George Stuart Graham-Smith for his pathological service at Addenbrooke's.[66] Graham-Smith's work was recognized by the hospital and in 1902 he was appointed Clinical Pathologist. After that the importance of clinical pathology was increasingly recognized by the hospital medical staff and in 1908 they appointed Woodhead as Honorary Consulting Pathologist, John Aldren Wright (Assistant Physician to the Hospital) as Pathologist (anatomical) and Walter Malden (a local General Practitioner) as Clinical Pathologist. Malden succeeded in persuading the mother of John Bonnett, Secretary to the hospital, to fund a clinical laboratory for the hospital. The laboratory was opened in 1914 and was named 'The John Bonnett Memorial Laboratory'.[67]

Another episode in the Allbutt-Woodhead association was the foundation of a research hospital on Rock Road, Cambridge in 1907. Both Woodhead and Allbutt were involved in this foundation. When the hospital was founded, it had only five beds and a laboratory. Woodhead was responsible for the collection of subscriptions for its maintenance. The hospital was directed by a Committee for the Study of Special Diseases, whose members included Allbutt, William Osler, William Church, Jonathan Hutchinson, Richard Douglas Powell, Henry Morris, William Watson

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[65] Ibid., p. 159.
[66] Ibid., p. 165.
[67] Ibid., p. 166.

Cheyne, Howard Marsh, Thomas Barlow, Victor Horsley and Donald MacAlister.[68] The aim of the hospital was to investigate chronic diseases with the use of laboratory work and experimental techniques. The hospital only received patients with rheumatoid arthritis and they were treated by Thomas Strangeways, a pathologist and Woodhead's associate, joining Cambridge University in 1898. The Committee published their treatment method and research results in *The Bulletin of the Committee for the Study of Special Diseases*, issued in 1905, 1907, 1908 and 1910.[69] In 1912, the hospital was renamed as 'the Cambridge Hospital for Special Diseases'. Sir Charles Brown of Preston, persuaded by Allbutt to support medical research, founded a studentship in pathological research, and provided photomicrographic equipment outfit and a complete X-ray apparatus for the hospital.[70] All this, as well as their involvement in the foundation of the Pathological Society of Britain and Ireland (as discussed in chapter one) indicates that Woodhead and Allbutt were productive partners in the promotion of experimental pathology into England.

In Cambridge, Allbutt made himself an exemplar of the physician-researcher. He cultivated an atmosphere in which young medical students would not oppose science *per se*. This of course agreed with the ideal of the preclinical scientists in the Special Board of Medicine who wanted to base the Cambridge medical curriculum on a laboratory and research-oriented culture.[71] Allbutt's efforts in promoting scientific medicine, however, were not limited within Cambridge. His participation in the MRC showed that, in his view, scientific medicine should be promoted throughout the whole country.

[68] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, pp. 180-181.
[69] Ibid.
[70] Ibid.
[71] Weatherall, *Gentlemen, Scientists and Doctors*, p. 133.

Allbutt was a founding member of the MRC which was closely involved in the implementation of the hospital unit system in England.[72] This committee, established in 1913, was aimed to conduct and promote medical research throughout the whole country. Its financial source was a fund paid by the citizens insured under the National Insurance Act of 1911. It should be noted that in the early 1910s Allbutt was for four years a member of the Insurance Acts Committee of the British Medical Association and a member of the Government's Advisory Committee of the National Insurance Act.[73] He was very concerned about how the insurance could effectively benefit the development of medicine and was forward in arguing for his view. For instance, in January 3rd 1912 he wrote a vigorous letter to *The Times* (London), conveying the message to the public that the National Insurance Act must benefit the development of medicine and criticizing the continuation of a contract method of practice at the time.[74] To describe the contract method, he wrote:

> ...in his Insurance Bill the Chancellor was content with an antiquated notion of medicine and of medical service; he took for granted, without inquiry, a notion built of some vague knowledge of village clubs and of the old-fashioned *vade mecum* way of doctoring. This is, 'For such and such a disease, such and such a drug; take the mixture, drink it regularly, and get well if Nature will let you'.[75]

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[72] Other members of the MRC included Walter Morley Fletcher, the Secretary (Michael Foster's student and an enthusiast about biochemistry), Frederick Gowland Hopkins (a comrade of Fletcher in building up biochemistry as a discipline and later became the Director of Dunn's Institute at Cambridge), Christopher Addison (former Professor of Anatomy and Dean of St Bartholomew's Hospital, and the first Minister of Health appointed in 1919), Waldorf Astor (former Chairman of the Departmental Committee on Tuberculosis), Charles John Bond (Assistant Surgeon to the Leicester Royal Infirmary and an amateur biologist), William Bulloch (a student of Robert Koch, Professor of Bacteriology at the London Hospital and Chairman of the governing body of the Lister Institute), Matthew Hay (Professor of forensic medicine at Aberdeen University and a member of the Carnegie Trust), William Boog Leishman and the Chairman, Lord Moulton.

[73] Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, pp. 201-202.

[74] Ibid., p. 202.

[75] Cited in ibid.

Next, he criticized the contract method. It should be noted that this criticism was consistent with that of the case-taking method (discussed in the last chapter):

> ...contract practice will stand lower in public esteem, and will be of lower average efficiency and much less humane; it will dampen the aspirations and blot the high-minded ideals with which I, who know, say that the young physicians of to-day are entering our profession; and it will push them back to old-fashioned routine and to ill-remunerated and therefore undervalued services.[76]

In November the same year at the General Medical Council, Allbutt moved the following resolution:

> ...the Insurance Act Committee [of the Council] be instructed to consider the interests of medical education the means and arrangements under the Act for providing those aids to diagnosis, treatment, and research which modern pathology has made available, and be authorised to make representations to the authorities on these and any other matters arising out of the Act which come within the functions of the Council.[77]

The resolution was passed. All this indicated that Allbutt was active in channelling national resources to making English medicine more scientific.

In its first year, the MRC had weekly meetings at Lord Moulton's (the Chairman) house. Allbutt's contribution, as Walter Morley Fletcher, the Secretary of the Committee, described, was remarkable:

> He [Allbutt] greatly aided the original Committee in forming the general design of having a limited scientific staff of their own in a central institute, while reserving the greater part of the available funds to assist work all

[76] Ibid.
[77] Cited in ibid., p. 206.

over the country, either initiated by the Committee or proposed to them by the workers themselves.[78]

During the First World War, Allbutt was actively involved in the policy of discriminating particular diseases for expert treatment in special centres.[79] Although he retired from the Committee in 1916, he kept in touch with it until his death.

With Allbutt, the MRC achieved some substantial goals, one of which was the purchase of the Mount Vernon Hospital building at Hampstead in 1914 as its Central Research Institute, which later became the National Institute for Medical Research (NIMR) in 1920.[80] The Institute consisted of four departments: department of biochemistry and pharmacology (directed by Henry H. Dale, who became the overall Director of the Institute in 1928); department of applied physiology (directed by Leonard E. Hill); department of bacteriology (directed by Almroth Wright); and department of statistics (directed by John Brownlee). Each department, representing a discipline, played an important role in defining medical problems and in planning medical-research projects in the early twentieth century. While bacteriology had been prospering in England since 1870s and medical statistics had been a familiar subject to English medical men in the 1910s, biochemistry and applied physiology appeared remarkably new. The establishment of these two departments at the NIMR seemed to elevate their methods as officially recognized approaches to disease investigations. This elevation must have been facilitated by members of the MRC who privileged the biological sciences, among whom Allbutt was definitely prominent.[81]

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[78] Cited in ibid., p. 208.
[79] Ibid.
[80] *Annual Report of the Medical Research Committee*, London, H.M.S.O., 1914-1915. p. 8.
[81] Other biologically-minded members of the MRC included Fletcher and Hopkins. At Cambridge, both of them fought to develop general biochemistry as an independent subject from Foster's programme of general physiology. (See Robert E. Kohler, *From Medical Chemistry to Biochemistry*, Cambridge University Press, Cambridge, 1982, p. 73.) Moreover, Fletcher persuaded the Dunn trustees to found in 1924 the Dunn Biochemistry Laboratory to which Hopkins was appointed Professor. (The

In 1916, the MRC established a fifth department, the Department of Clinical Research, which was a sister department to that of applied physiology. This department investigated 'soldier's heart' and its approach was highly physiological. Allbutt, James Mackenzie and William Osler formed an advisory committee and Thomas Lewis, an advocate of 'clinical science' in the late 1920s and the 1930s, was on the permanent staff. The Mount Vernon building, which had been handed over to the War Office and had become a military hospital (Hampstead Military Hospital) in 1914, was converted to a hospital specializing in cardiological studies.[82] In 1918, this department was renamed as "the Department of Clinical Research and Experimental Medicine." The new department, in the charge of Lewis and Thomas Renton Elliott, was moved to University College Hospital.[83] The aims of the new department were to marry laboratory work to clinical research and to make clinical research and teaching available at the same place. This department can be regarded as the predecessor of hospital units in England.

As discussed in chapter one, William Osler was Allbutt's close associate. They shared the view that the hospital unit system was necessary for making English medicine more scientific.[84] In 1911, Osler delivered an address 'The Hospital Unit in

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Laboratory was later renamed as the Dunn's Institute of Biochemistry and Hopkins became its Director.) (See Robert E. Kohler, 'Walter Fletcher, F. G. Hopkins, and the Dunn Institute of Biochemistry: A Case Study in the Patronage of Science', *ISIS*, 1978, xlix: 331-355.) The Dunn's Institute, as Fletcher and Hopkins expected, served three important functions: (1) It freed biochemistry from human physiology and made it a biological science. (2) It supplied and assembled biochemists for other MRC medical research tailored by Fletcher. (3) From the late 1910s onwards, the MRC enforced in England the hospital unit system, which demanded a great deal of biochemists. The Dunn's Institute was therefore to train qualified biochemists for hospital units. (See Kohler, *From Medical Chemistry to Biochemistry*, p. 81.)

[82] Christopher C. Booth, 'Clinical Research', in Austoker, J. and Bryder, L. (eds), *Historical Perspectives on the Role of the MRC*, Oxford, Oxford University Press, 1989, pp. 206-207.

[83] Ibid., p. 208.

[84] In his recollection, Osler remarked that the idea of the hospital unit system which was realized in Johns Hopkins Hospital was fascinating in late nineteenth-century America:

> The opening of the Johns Hopkins Hospital in 1889 marked a new departure in medical education in the United States. It was not the hospital itself, as there were many larger and just as good; it was not the men appointed, as there were others quite as well qualified; it was the organization. For the first time in an English-speaking country a

University Work' before the Northumberland and Durham Medical Society. This address was the first to advocate the hospital unit system in England. Osler chose the Northumberland and Durham Society as his audience because the society had no direct university affiliation. University affiliation was the theme of Osler's paper. He regarded the main function of the hospital unit system as bringing up medical education to a university standard. Such a view was common among the Johns Hopkins medical school teachers.

In his address, Osler first pointed out that in Durham, London and Edinburgh, medical education lacked university involvement.[85] He complained that this phenomenon was highly problematic:

> All agree that a study of the problems of disease and the training of men and women in the technique of the art come within the sphere of the university. England has suffered sadly from an absence of great medical faculties, such as exist on the Continent; and nowhere is the more evident than in the dissociation of the hospitals have been built by men who had no idea whatever of their scientific needs, and too often staffed

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hospital was organized in units, each one in the charge of a head or chief. The day after my appointment I had a telegram from Dr. Gilman, President of the university, who had been asked to open the hospital, to meet him at the Fifth Avenue Hotel, New York. He said to Dr. Welch and me: "I have asked you to come here as the manager is an old friend of mine, and we will spend a couple of days; there is no difference really between a hospital and a hotel". We saw everything arranged in departments, with responsible heads, and over all a director. "This", he said, "is really the hospital and we shall model ours upon it. The clinical unit of a hospital is the exact counterpart of one of the sub-divisions of any great hotel or department-store". (A. McGehee Harvey, Gert H. Brieger, Susan L. Abrams, and Victor A. Mckusick, *A Model of Its Kind*, vol., 1, p. 7.)

As Professor of Medicine and Physician-in-chief at Johns Hopkins, Osler refined the system by introducing his German experience that each departmental head could choose a group of senior resident physicians as assistants. (Michael Bliss, *William Osler: A Life in Medicine*, Oxfore, Oxford University Press, p. 175.)

In 1905, Osler accepted the Regius Professorship of Medicine at Oxford University. During his appointment, he forcefully supported the introduction of scientific medical education to Oxford. For instance, he was influential in the creation of the Chair of Pathology which James Ritchie undertook. (Ibid., p. 344.) He was also involved in the establishment of pharmacology at Oxford and the appointment of Charles Sherrington as Professor of Physiology. (Ibid.)

[85] William Osler, 'The Hospital Unit in University Work', *The Lancet*, 1911, i: 211.

> by men who knew little and cared less for anything beyond their primary function [the cure of the sick].[86]

The heart of the problem, Osler argued, was that the hospital teaching staff lacked a scientific spirit. They had rich clinical experience but they overlooked the importance of experimental pathology and research:

> The pathological department, often only a dead-house so far as the hospital is concerned, is no way coördinate with the others. Laboratories of bacteriology, clinical chemistry, microscopy, and of clinical physiology may or may not exist.[87]

Apart from the lack of scientific minds and a research culture, English hospitals, Osler added, suffered from serious organizational problems: the general hospitals employed too many non-resident physicians and surgeons whereas the number of resident staff was miserably inadequate.[88] Promotion was difficult. Once a young practitioner became a senior hospital physician, his first consideration would be private practice, from which he could earn a living. Scientific research was almost forgotten.[89] The solution for all this, Osler held, was that "if we can convince the authorities that the subjects of clinical work come directly within the sphere of the university."[90] "The hospital unit", he added, "meets the condition–a department under the complete control of the university, or under the joint control of hospital and university."[91] In short, "[t]he truth is", Osler concluded, "we need an active invasion of the hospitals by the universities."[92]

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[86] Ibid.
[87] Ibid.
[88] Ibid.
[89] Ibid., p. 212.
[90] Ibid.
[91] Ibid.
[92] Ibid.

4 Allbutt's advocacy of the hospital unit system

Allbutt's echo of Osler did not appear until the late 1910s. This might have been due to the First World War, which created a great number of sick and injured people, and therefore resources and concern were focused on the cure of the sick rather than institutional and educational reform. In 1919, Allbutt delivered an address 'The New Birth of Medicine' at a Clinical and Science Meeting held in London. In the address, Allbutt argued that in English medicine there was a cleavage between the scientists and the physicians:

> So complete and mischievous, however, has been the barrier between research and the industry of Medicine that a reaction from 'laboratorism' to 'symptomatology' has set in, because there are no intermediary workers-no engineers-between the knowledge getters and the knowledge dealers. Thus we see the laboratory investigators completely out of touch with practice, and practitioners faithless of theoretical principles-just 'Philistines'.[93]

The solution, Allbutt suggested, was that in every clinical school there should be a full-time professor, who had adequate knowledge of science and medicine, to bridge the gap between the scientist and the physician:

> In every adequate clinical school then there must be a professoriate; whole time-or nearly whole time-professors, with technical laboratory, biochemical and pathological, who with their assistant staff shall be engaged continually in irrigating our profession from the springs of the pure sciences.[94]

[93] Clifford Allbutt, 'The New Birth of Medicine', *The British Medical Journal*, 1919, i: 438.
[94] Ibid.

In Allbutt's view, these full-time professors should play a central role in the hospital unit system.

In the same year, Allbutt wrote to Sir George Newman on the suitable candidates of these full-time professors and he held that bright and young men would be promising:

> To have candidates as required means a nursery (and I may add skilled cultivators). Nearly all men of any maturity have committed themselves to private adventure and, even if disposed to change their whole plan of life, are probably spoiled for academic work. I see no way but to back some young man-keen and of intellectual promise, and trust to luck-say a man of twenty-eight or thirty. It is a chancy way, but so far as I see, the only way.[95]

The mediating function of the full-time professor was emphasized again in 'Modern Therapeutics' published in 1920:

> As physicians we call for three classes of men of science; first, the pure scientist, who lives his own inner disinterested life, unoccupied with any relations to things outside his study; secondly, a middleman, who, as an engineer, can adapt theory to practice – such men as the Directors of the new Hospital units; thirdly the modern practitioner, well educated in principles, taught to handle ideas, aware of the directions from which knowledge may flow, and open-minded enough to accept it, subject always to the contingencies which he best knows how to manage.[96]

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[95] Cited in Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, p. 242.
[96] Clifford Allbutt, 'Modern Therapeutics', *Practitioner*, 1920, ii: 163.

In 1921, Allbutt discussed the hospital unit system more fully in 'Some Comments on Clinical Units'. He began his discussion with the criticism that medical education in England lagged behind European countries:

> Some years ago, in the pre-war period, Sir William Osler wrote to ask me to take part in an endeavour to attract to English schools some of those overseas students who then were betaking themselves to Paris, Berlin, or Vienna; but hardly deigned to visit our medical schools, even on their way. With these aspirations I agreed, warmly agreed; but argued that these visitors would come here when there was something definite to come for, and not till then.[97]

The main difference, according to Allbutt, was because medical training in some important European cities was in the charge of full-time professors at hospital units, whereas in England it was in the charge of physicians who would rather spend more time and energy on practice than on teaching.[98] Moreover, the English physicians' teaching was based too much on personal experience and lacked a scientific approach.[99]

To introduce scientific teaching to English medical education, Allbutt re-stated the view that a hospital should be broken down into units and the Directors of the units should serve as the bridges between scientists and clinicians. The Directors should be knowledgeable about both the basic sciences and clinical medicine. "(T)he leader should not be a mere clinician, nor merely a laboratory worker, but one who has a 'footing in both camps', and knows the scope and power of each", Allbutt said.[100]

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[97] Clifford Allbutt, 'Some Comments on Clinical Units', *The Lancet*, 1921, ii: 937.
[98] Ibid.
[99] Ibid.
[100] Ibid.

Ideally speaking, the Directors would make medical students regard physic, surgery and the basic sciences as equal. The students would not only possess bedside observational skills, but would also have experimental skills and the scientific imagination for hypothesis-making. Trained in hospital units, they would be equipped with research techniques and method. They would be able to use the microscope, to stain specimens for microscopic observation, and to do minor surgery. They would be able to make cross-reference to different basic sciences. They would be Allbutt's ideal medical men.

In 'Some Comments', Allbutt's notion of ideal medical man was revealed in the section 'Proportion in Medical Education' in which he criticized Charters Symonds' view of medical education. Symonds, who was Surgeon to Guy's Hospital, claimed that in the early twentieth century the work load of medical instructors was too heavy. To relieve the situation, Symonds suggested that the teaching of medical sciences, such as anatomy and physiology, should be reduced whereas clinical teaching, which he regarded as the most important component of medicine, should be strengthened. Allbutt summarized Symond's view as follows:

> The student [according to Symonds] is to be brought to the bedside at the outset, in order that he may have before him continually the aptitudes for which he is to work. Anatomy is to be pruned, and a good third of it cut out, by rejections of its academic features...Physiology is to be domesticated in like manner, but not so drastically. The peculiar discipline of anatomy as a standard of close observation and accuracy might thus be lost, for this discipline is all or nothing.

Allbutt continued by quoting Symonds:

> Sir Charles Symonds (p.15) "by no means wishes to be understood as decrying the study of the collateral sciences – these handmaids of medicine" – (but) "do they hold, as taught to-day, [more than] their due proportion to the later subjects? However well informed a man may be in the preliminary sciences, the final court of appeal is at the bedside". He [the medical student] must attend rather to the cry of the children than to physical apparatus. And (p.16) "The only opportunity the student has for independent observation, it seems to me [Symonds], is in the clinical field, and the sooner he is brought there the better."[101]

Allbutt, however, criticized Symond's proposal for turning medical education back to apprenticeship. "Sir Charles Symonds", said Allbutt, "proposes a utilitarian reform or rather retrogression; he advocates what, rightly or wrongly, is virtually a return to apprenticeship".[102] If Symond's plan was enforced, the gap between medicine and the basic sciences would not be bridged. Symond's terms, such as "collateral sciences" and "handmaids of medicine", Allbutt claimed, signified a misconception of the relationship between clinical medicine and the basic sciences:

> Does not this [Symonds'] discourse on the whole reflect the mind of the craftsman, and rightly so, but at the same time diminish the scientific and thinking physician and surgeon?... And are not these phrases "collateral" sciences, "handmaids of medicine", and the like, misleading? These sciences are not annexes of medicine, nor frills about it, but partake of its very nature; they are mothers, not hirelings.[103]

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[101] Charters Symonds, 'The Hunterian Oration: Delivered at the Royal College of Surgeons of England on the 14th February, 1921', *The Lancet*, 1921, i. Cited in ibid., p. 939.
[102] Allbutt, 'Some Comments', p. 939.
[103] Ibid.

Allbutt's ideal medical man was a medical-scientific generalist, who, apart from receiving reasonable training in clinical medicine, should also be knowledgeable in the basic sciences and have surgical, anatomical, and experimental skills. In 'The Work of the National Medical Research Committee', published in 1916, Allbutt emphasized that the new medical man should be a man with a broad vision, rather than a specialist:

> Many men, clerks of science as one may call them, work assiduously and intensely at multitudinous small points, and, seeing each his own point and little more, yet do excellent service in accumulating facts under the direction of other and maturer minds. Nevertheless, if a young scientist has the ambition to excel in pathological research, he must try ever more and more to see something of the whole...If then all research into the nature of disease must radiate from physiology for all disease is but a perversion of the normal, or a declension from it, the investigator, if he is to be successful, must have some mastery of chemistry and physics also.[104]

Allbutt often criticized specialization. For instance, in 'The Universities in Medical Research and Practice', he made the following claim:

> Narrow "specialization" – I use the common word – is found in medicine, as in other arts, among people of narrow culture;...Specializing is prone to be quackish...[105]

Specialization, in Allbutt's view, prevented medical students from having a holistic view of medical knowledge. In short, Allbutt's ideal physicians should always expand their domain of competence by crossing the boundaries between medicine and other

[104] Clifford Allbutt, 'The Work of the National Medical Research Committee', *The British Medical Journal*, 1916, ii: 787.
[105] *Idem*, 'The University in Medical Research and Practice', *The British Medical Journal*, 1920, ii: 2.

disciplines, such as surgery and experimental pathology. They were to be trained under the hospital unit system.

5 Conclusion

In *Gentlemen, Scientists and Doctors*, Mark Weatherall characterizes Allbutt as a bridge between the preclinical scientists and the clinicians in Cambridge. This is true. However, a more comprehensive study of Allbutt's life reveals that there is more to him than this. To affiliate clinical studies and the preclinical sciences is one of the manifestations of Allbutt's generalist view of the medical man. This view also manifested in his effort to unify medicine and surgery, to promote the hospital unit system, and to advocate the use of the ophthalmoscope and the clinical thermometer in his early career. None of these things should be regarded separately.

Boundary breaking is also an important theme in the last and the present chapter. Allbutt's construction of medical generalism required the breaking of professional and cultural boundaries, such as those between physicians, ophthalmologists, surgeons and scientists, as well as the conventional incompatibility of the gentility and handiwork in the medical profession. This is a tremendous re-categorization. Allbutt was distinctive in that his reform was consistent, comprehensive and life-long. In the light of this, it is justifiable to regard Allbutt as a revolutionary medical thinker.

Chapter Four

The Elimination of Morbid Entities

"A sick plant or animal is but itself in another *state*, or state more transient and less useful." (my italics) Clifford Allbutt[1]

1 Introduction

In the last two chapters, I discussed Allbutt's criticism of English clinical medicine and his ideas for reform of the role of the physician. This chapter looks at a related intellectual change: that of the concept of disease. I discuss Allbutt's criticism of the morbid entity view of disease and his advocacy of a physiological view: the view that disease is a defective state/mode of life, or a deviation from the normal.[2] This view in its modern form was derived from the experimental physiology that flourished in Germany. Allbutt's campaign for the employment of a physiological view of disease should be seen as one of the routes by which German medical theory was introduced into English medicine. Whereas the influence of nineteenth-century German medical technology has been widely discussed by historians, the dissemination of German medical theories by nineteenth-century English doctors seems to have been overlooked. My discussion in the present chapter, I hope, will fill this historiographical lacuna.

In what follows, I first discuss Allbutt's criticism of the morbid entity view and outline the history of this view. Next, I argue that Allbutt's concept of disease came from physiological medicine. This concept, as my analysis shows, had a long history and it was associated with another longstanding idea: the healing power of nature,

[1] Clifford Allbutt 'Introduction', in Clifford Allbutt (ed), *A System of Medicine*, 1st ed., 8 vols, London, Macmillan and Co., Limited, 1896, vol. 1, xxiv.

which Allbutt also adopted. I also discuss Allbutt's criterion of a scientific concept of disease with reference to his appreciation of Jean Martin Charcot, his view of the relation between medicine and religion, and Allbutt's close friend, George Henry Lewes' criticisms of Charles Darwin's misuse of figurative language, which sheds light on our understanding of Allbutt's criticism of the morbid entity view. Last, I examine how Allbutt used history to justify his advocacy of physiological medicine.

2 The morbid entity tradition

It is evident that the concept of disease is a recurrent theme in Allbutt's medical writings. Throughout the late nineteenth and the early twentieth century, he incessantly criticized the morbid entity view. His earliest address specifically devoted to this subject was 'Progress of the Art of Medicine' published in 1870. In his 'Introduction to A System of Medicine' published in 1893, he noted that to regard disease as a morbid entity was to personify disease and he claimed that this was a misuse of figurative language.[3] In 'Words and Things', an address delivered before the Students' Physical Society of Guy's Hospital in 1906, he maintained that disease was not a thing and that 'entity' was a bad word to describe disease.[4] In 1919, thirteen years after the publication of 'Words and Things', Allbutt once more discussed the concept of disease in 'Medicine and the People: A Review of Some Latter-Day Tracts', a review article of Sir George Newman's monograph, *An Outline of the Practice of Preventive Medicine*.[5] In this article, Allbutt examined the concept

[2] To describe his concept of disease, Allbutt often used expressions, such as 'a mode of life', 'a process', 'a defective state' and 'a loss of equilibrium". All this points to the notion that diseases were deviations from the normal.
[3] Allbutt, 'Introduction', (*A System of Medicine)*, xxii.
[4] Clifford Allbutt, 'Words and Things', *The Lancet*, 1906, ii: 1122.
[5] Newman's monograph was a discussion of the role of preventive medicine, as he conceived it. He argued that preventive medicine was more than public health and sanitary control. It was a science which dealt with the causes of both the individual's health and his illnesses.[5] Newman also discussed the nature of disease; the problems of the public health service in late nineteenth-century England and

of disease using a historical approach. He argued that the idea of morbid entity had a long history and it was still important to the influential physicians of his time:

> In spite of the great Ionian thinkers, and in the following of imaginary spirits and witchcraft, the notion that disease is an entity has reigned for hundreds of generations, and over realms of space, to the present day, when even considerable medical writers still continue to talk of diseases as "entities". Thus for our forefathers heat, for instance, was an entity, electricity a "fluid". Against this "daemonic" notion of disease Sir George Newman fights directly and indirectly.[6]

Such a view was consistent with Allbutt's historical account of Roman and Byzantine medicine. According to Allbutt, magic played an important role in early Roman folk medicine. In *Greek Medicine in Rome*, Allbutt argued that in primitive Roman medicine diseases were often associated with evil spirits and witchcraft.[7] Roman medicine, according to Allbutt, was inspired by the Ionian and became scientific. However, in the Byzantine period, demonism permeated medicine and the idea of the morbid entity once again became central to it:

> Demonism, then and since, in Byzantine, papal, and modern times, entered deeply into the conceptions of East and West, and closely attached itself to Medicine; its pallid reflection we may perceive even yet as the "morbid entities" emanating from distinguished physicians in our midst.[8]

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his proposed solutions; and argued for the integration of medicine with the basic sciences. For details, see George Newman, *An Outline of the Practice of Preventive Medicine: a Memorandum addressed to the Minister of Health*, London, His Majesty's Stationary Office, 1926.

[6] Clifford Allbutt, 'Medicine and the People: A Review of Some Latter-Day Tracts', *The British Medical Journal*, 1919, ii: 763.

[7] Clifford Allbutt, *Greek Medicine in Rome: The Fitzpatrick Lectures on the History of Medicine Delivered at the Royal College of Physicians of London in 1909-1910*, London, Macmillan and Co., Limited, 1921, pp. 31-55.

[8] Ibid., p. 400.

I think that Allbutt's claim that there was a tradition of regarding disease as a morbid entity is justified. In the history of English medicine, Thomas Sydenham (1624-1689) can be regarded as the reviver of the morbid entity view held by Theophrastus Philippus Aureolus Bombastus von Paracelsus (1493-1541). [9] Sydenham's nosography, in which the morbid entity view was assumed, was absorbed and transformed by François Boissier de Sauvages, Carl von Linné, William Cullen and others in the eighteenth century into a nosological tradition which emphasized classification of disease and the seeking of common causes.[10] Although this clinical nosological enterprise was replaced by Paris medicine in the late eighteenth century,

[9] Knud Faber argues that Sydenham's nosography provided disease with an ontological status. (See Knud Faber, *Nosography: The Evolution of Clinical Medicine in Modern Times*, New York, Paul B. Hoeber, 1978, ch. 1.) This view is echoed by Kenneth D. Keele, who notes that Sydenham "intended a deeper analogy than that merely between symptom patterns and botanical identification". Sydenham, Keele adds, "saw diseases as generating, growing and ripening in the body". (Kenneth D. Keele, 'The Sydenham-Boyle Theory of Morbific Particles', *Medical History*, 1974, xviii: 240-248.)

Moreover, F. Kraupl Taylor argues that Sydenham adopted Aristotle's theory of Substantial Form and assumed that there were Substantial Forms or species of disease. According to Taylor, Aristotle held that Substantial Forms consisted of essential attributes. When they combined with matter, they generated a class of physical objects with typical attributes. Since they determined classes of physical objects, they were also termed 'species'. To elaborate Sydenham's view of disease, Taylor wrote: "For Sydenham, these postulated disease species were obviously God-created like all other living species in those pre-Darwinian times. They had an immutably higher reality than any of their transient realizations in the disease-histories of individual patients because those disease-histories were liable to be marred through interference from 'accidental forms'" (F. Kraupl Taylor, 'Sydenham's Disease Entities', *Psychological Medicine*, 1982, xii: 247.) All this indicates that in Sydenham's medicine, Substantial Forms or species of diseases were regarded as entities. This view is important to my discussion because Allbutt's contemporaries employed the word 'species' rather than 'entities' when they described diseases. But one should bear in mind that these two terms could be used interchangeably.

[10] According to Faber, one of the prominent representatives of the nosological tradition was François Boissier de Sauvages. Sauvages was a botanist, physician and nosologist. He grouped diseases into classes, orders and genera, just as botanists and zoologists grouped plants and animals. In 1731, he published his first treatise *Traite des Classes des Maladies* and in 1763 a big collection *Nosologia Methodica Sistens Morborum Classes, Genera et Species* in which he enumerated 2,400 different kinds of diseases and placed them into classes, orders, genera and finally species with reference to symptoms.

Sauvages's nosological work was stimulating and many medical men found that methodical nosologies were of much use and were much needed. Carl von Linné, a Swedish botanist, was deeply impressed by Sauvages' systematic arrangement of disease. Linné was Professor of Theoretical and Practical Medicine at Upsala and he largely based his lectures on Sauvages' system. These two men also carried out an extensive correspondence and became close friends. In 1763, Linné published a brief *Genera Morborum* for the use of his students.

William Cullen, an admirer of Linné, was also keen on nosology. He published a nosological work *Methodical Nosology* in 1769. Taking Linné's botany as a model, Cullen classified diseases by symptoms into classes, orders, genera and species. With all these works, an 'ontological', nosological tradition came into being and was continued by others' nosologies such as David Macbride's the idea of morbid entity was preserved in pathology.[11] The leading figures of Paris medicine, such as Philippe Pinel, Marie-François-Xavier Bichat and René-Théophile-Hyacinthe-Laennec, continued the ontological tradition of the theory of disease by using pathological anatomy and physical examination.[12] This view eventually was adopted by nineteenth-century English practitioners. English medicine of the time, on the one hand, perpetuated Sydenham's empiricist and nosographical tradition; one the other, it also adopted the new approach created by the Paris School.[13]

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publication at Dublin in 1775; Johann Baptist Michael Edlervon Sagar's at Vienna in 1776 and Bonaventura Ignazio Vitel's at Lyons etc. (For details, see Faber, *Nosography*, pp. 22-27.)

[11] Whereas eighteenth-century nosologists, based on symptomatology, classified diseases and investigated their common causes based on signs observed on the surface of the patient's body and symptoms reported by the patient, Parisians opened up the corpse and argued that many of the characterizations of symptomatological nosologies were wrong. With the use of pathological anatomy, the Parisians located disease entities as lesions and substantiated the idea of disease entities. Disease entities no longer existed merely in two-dimensional pictures. They were found places in three-dimensional space.

[12] According to Faber, Philippe Pinel, one of the founders of Paris medicine, was keen on nosology. In his chief work, *Nosologie Philosophique*, published in 1798, Pinel claimed that there were essential fevers. Each was characterized by a unique course and characteristic symptoms and was regarded by Pinel as a morbid entity. Marie-François-Xavier Bichat identified twenty-one kinds of tissues in the human body and demonstrated how each tissue could be separately affected with characteristic symptoms. Bichat's diligence in the dissecting room produced a specific disease classification and localization. Laennec's use of pathological anatomy and indirect auscultation created a new picture of disease, particularly diseases of the lungs, such as emphysema, acute and chronic edema of the lungs, bronchiectasis and gangrene of the lungs. In short, Paris medicine created a new pathologico-anatomical approach to the classification of disease and it reinforced the notion of disease as embodied morbid entity. (For details, see Faber, *Nosography*, pp. 28-58.)

[13] As Faber points out, the clinical schools of St George's Hospital and Guy's Hospital in London were influenced by the Paris school. English clinicians there "worked according to the same principles as those that guided the Paris school, and their chief contributions were to nosography." (Faber, *Nosography*, p. 53.) These clinicians combined pathological anatomy and clinical observation to build up clinical pictures of specific diseases. For example, Richard Bright, in his *Reports of Medical Cases* published in 1827, demonstrated a relation between anatomical changes in the kidneys and albuminuria. (Ibid., p. 52.) In this way, he created a clinical picture of chronic inflammations of the kidneys. In nineteenth-century England, pathological anatomy became an important practice for hospital physicians. The intensive practice of pathological anatomy became a necessary condition for hospital physicians to achieve consultant status. Moreover, early English stethoscopists such as Thomas Hodgkin and Charles Williams learned stethoscopic technique directly from Laennec. (William F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century*, Cambridge, Cambridge University Press, 1994, p. 47.) Physicians such as W. H. Walshe, pathologists such as Robert Carswell, and surgeons such as Astley Cooper and William Bowman visited Paris and receiving training there. (Ibid.)

However, William F. Bynum suggests that, in terms of medical teaching, English hospitals were less resourceful and more conservative than French ones. According to Bynum, in the late nineteenth century, the teaching staff of London medical schools seldom worked as full-time teachers. They earned their income partly from student fees and partly from private practice. Private practice was regarded as more important in their career because it was the usual path to fame. (Ibid., p. 48.) In turn, some hospital governors regarded medical schools as a necessary evil. They held that the principal aims of hospitals were philanthropy and patient care. The presence of a lot of students might deflect

Nineteenth-and-early-twentieth-century English medicine preserved the concept of disease as a morbid entity or species. Cullen's *Synopsis of Nosology*, in which diseases were given ontological status, was published in London in 1828. It was supplemented with a classification of diseases by an English physician and naturalist, John Mason Good, and an arrangement of skin diseases by an English dermatologist, Robert Willan. Like Cullen, these two English medical men grouped diseases into class, order, genus and species.

Another example of the support of the morbid entity view by nineteenth-century English physicians is Richard Bright and Thomas Addison's presupposition of Cullen's classificatory framework. In their joint work *Elements of the Practice of Medicine* published in 1834, Bright and Addison disagreed with Cullen's classification of continued fever. However, the fact that they regarded disease as species was reflected in this disagreement:[14]

> When dividing Idiopathic fevers into the Intermitting, Remitting and Continued, Dr. Cullen subdivided the latter or Continued into three distinct *species* – Synocha, Synochus, and Typhus, a subdivision that has created much ambiguity in treating the subject of idiopathic fever; for whilst the two latter, synochus and typhus, are mere varieties of the same fever, the synocha or inflammatory fever, as it is usually called, is of extremely rare occurrence unconnected with some local inflammation or catarrhal affection, and may on that account, with

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the physicians' attention and therefore violated these aims. (Ibid., p. 49.) English hospital patients were not used to being subjected to repeated physical examinations or having their surgical operations performed in front of groups of students. (Ibid.) Equally, unlike French doctors, some English doctors disliked discussing their cases in front of the patients. They would rather use Latin or keep themselves away from the bedside during the discussions. (Ibid.)

[14] For the equivalence of 'species' and 'entities' in this context, see note 9 above.

great propriety, be treated of under respective heads of Inflammation and Catarrh.[15] (my italics)

For two people to disagree with each other in this way, they must share some underlying assumptions.[16] In this context, Bright and Addison did not disagree with Cullen's use of the idea of species, which had been granted ontological status. They only argued that synochus and typhus should not be regarded as different species and synocha should belong to another class of disease. That is, they rejected the particular classification made by Cullen, but accepted his assumption that diseases could be classified into species.

In 1915, Samuel Gee, an elderly and much revered physician at St. Bartholomew's Hospital, published *Medical Lectures and Aphorisms*. In a chapter on aphasia, Gee asked the following question:

> What is the nature of aphasia: to what more general term can we refer the *species*? Aphasia is a *species* of paralysis: paralysis of the special movement of speech.[17] (my italics)

This indicates that the tradition of regarding disease as a specific and embodied morbid entity continued until Allbutt's time.

To sum up, the concept of disease as a morbid entity, Allbutt argued, was entrenched in early Roman and Byzantine medicine. Although its supernatural character faded in early modern English medicine, its central 'ontological' character was sustained by Sydenham's nosography. It was also preserved in the eighteenth-century nosological enterprise. Although Paris medicine marked, in Michel Foucault's terms, an epistemological rupture with the eighteenth-century nosological

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[15] Richard Bright and Thomas Addison, *Elements of the Practice of Medicine*, only 1 vol. published, London, Longman, Orme, Brown, Green and Longmans, 1839, vol. 1, p. 2.

[16] For example, when A claims that "X is good" and B claims that "X is bad," A and B must at least share the idea that there is X.

method, it reinforced and substantiated the 'entitiness' of disease. Nineteenth-century English medical men synthesized the characteristics of Paris medicine with their own empiricist and nosographical tradition. This synthesis underpinned the idea of morbid entity in English medicine.

3 Disease as a defective mode of life and physiological medicine

In this section, I argue that (1) Allbutt adopted his concept of disease from German physiological medicine; (2) the concept of disease as a defective state/mode of life indeed had a long history; (3) Allbutt also adopted the idea of natural healing power, which, like his concept of disease, also had a long history and was employed by leading proponents of physiological medicine.

3.1 The source of Allbutt's concept of disease

'Progress of the Art of Medicine' was an address that Allbutt delivered to Caius College, Cambridge University, in 1870. In this address, he explained his concept of disease:

> Modern pathology has to answer that disease is no real existence or separable entity, to be studied apart from the body – that it is not an evil spirit, a chemical substance, a humour or poison in the blood, nor even a parasitic fungus; but that it is the living body itself in a peculiar state. We regard disease simply as a mode of life, as a process or a series of phenomena, which differ only in rate or in order from the healthy series. [18]

[17] Samuel Gee, 'Aphasia'. *Medical Lectures and Aphorisms*, London, Henry Frowde, 1915, p. 29.
[18] Clifford Allbutt, 'Progress of the Art of Medicine', *The Lancet*, 1870, ii: 38.

Although Allbutt did not refer to German physiologists, what he meant by 'modern pathology', I argue, was the pathology of physiological medicine or 'patho-physiology' which flourished in Germany. Physiology first became a profession and permeated medicine in nineteenth-century Germany. Indeed, it is widely agreed that scientific professions first came into being in the German-speaking lands.[19] Intellectually speaking, nineteenth-century German scientists regarded themselves as reacting against speculative, idealistic Romantic philosophy.[20] They emphasized experimentation and their thinking was often materialistic though not all were materialists. As Timothy Lenoir points out, between 1840 and 1860 there were three competing approaches in German physiology.[21] The first was the morphological tradition represented by Rudolph Wagner and Johannes Müller. This approach emphasized the importance of structure in understanding function and its main tools were the microscope and histological work. The second approach was the biophysical one represented by the 1847 group composed of Carl Ludwig, Emil du

[19] According to Bynum, in the nineteenth century, the German states possessed certain characteristic conditions which favoured the rise of the scientific profession. Freedom to learn and freedom to teach were important values in the German states. Research institutes devoted to particular subjects were established. These institutes, though attached to universities, enjoyed a high degree of autonomy. They were also funded by the states. (Bynum, *Science and the Practice of Medicine*, p. 95.) As Timothy Lenoir points out, the young imperial German states had the conviction "that in medicine no less than in industry even the most apparently insignificant fact discovered in the pursuit of purely theoretical interests and abstract concerns can suddenly receive an immeasurable practical importance." (Timothy Lenoir, 'Science for the Clinic: Science Policy and the Formation of Carl Ludwig's Institute in Leipzig', in William Coleman and Frederic L. Holmes (eds), *The Investigative Enterprise: Experimental Physiology in Nineteenth-Century Medicine*, Berkeley, University of California Press, 1988, p. 140.) Scholars and scientists were paid as full-time staff and disinterested research was encouraged. Comparatively, French experimental physiologists, such as Magendie and Claude Bernard, did not enjoy the same kind of institutional support as German physiologists did. All of Magendie's early teaching was extramural. (Bynum, *Science and the Practice of Medicine*, p. 103.) Magendie obtained the chair of medicine at the Collège de France, which, however, was not part of a university. In the Collège, he delivered lectures on experimental physiology and pathology but these lectures were only optional. (Ibid., p. 104.) Although Bernard's career was more successful than Magendie's, Bernard never headed an institute, nor he ever founded a research school in the Germanic sense. (Ibid.) In short, the development of scientific research in Germany in the nineteenth century was faster than that in France because, in the former, institutional support was stronger and better organized.
[20] Ibid., p. 97.
[21] Lenoir, 'Science for the Clinic', p. 144.

Bois-Reymond, Hermann Helmholtz, and Ernst Brucke.[22] The group was anti-vitalistic and aimed to reduce all physiological phenomena to their physical and chemical components.[23] The spirit of the group was clearly manifested in Ludwig's statement about the 1847 meeting in Berlin: "We four imagined that we should constitute physiology on a chemico-physical foundation, and give it equal scientific rank with Physics..."[24] The third approach was the biochemical one represented by Justus von Liebig, Carl von Voit, Max von Pettenkofer and Theodor Ludwig Wilhelm von Bischoff. They held that metabolism was best explained by chemistry rather than physics. In 1860s, these approaches were coalesced into one. Medical scientists, such as Ludwig and Carl Wunderlich, came to agree that a scientific medicine should be based on an integration of experimental physiology, microscopic anatomy, biophysics, and biochemistry. The representative centre of this integrated approach was Ludwig's institute in Leipzig.[25]

Being antagonistic to Romantic philosophy, in which diseases were regarded as parasitic entities and diseased organs as special organisms with their own laws of parasitic developments, the advocates of German physiological medicine were particularly critical of the morbid entity view of disease. For instance, Wunderlich claimed that the setting up disease entities was an intellectual pollution:

> Such a view which takes abstract concepts for things, implying their actual existence and at once treating them as entities, is called ontology.....To the most widespread and the most dangerous consequences of ontology belongs the practice of setting up species of

[22] Bois-Reymond, Helmholtz and Brucke were Müller's students. However, they were opposed to Müller's vitalism.
[23] Paul F. Cranefield, 'The Organic Physics of 1847 and the Biophysics of Today', *Journal of the History of Medicine and Allied Sciences*, 1957, xii: 407.
[24] Burdon Sanderson, 'Ludwig and Modern Physiology' as reprinted in Sir John Burdon Sanderson, Oxford, 1911, p. 281. Cited in ibid.

> diseases which have been grouped in classes in the same way as plants. By raising them to the dignity of species these ontological personifications received, as it were, the sanction of natural history.[26]

Echoing Wunderlich, Rudolf Virchow held that disease was a defective condition of life and the goal of physiological medicine should be to convert this condition back to normal, rather than to defeat any morbid entity:

> The destruction of the ontological conception of disease is also a destruction of ontological therapy, of the school of the specifics. The subjects of therapy are not diseases but conditions; we are everywhere only concerned with changes in the condition of life. Disease is nothing but life under altered conditions.[27]

Although the target of Allbutt's criticism was not Romantic philosophy, his view of disease was consistent with that of Wunderlich and Virchow. Allbutt argued for the physiological concept of disease throughout his career. For instance, in the 'Introduction' to *A System of Medicine*, he wrote:

> A disease is a particular state of an individual; and, although certain families show persistent bents to certain kinds of morbid variation, yet the constancy of this fashion bears a very small proportion to that of the characters of a variety in a biological sense. Moreover, although careless clinical teachers will continue to speak of the "the development" of this or that disease, yet disease is no new advance, but a retreat, a stage of decline, failing in relative stability, a state which must end either in a recovery of the normal balance or in

[25] Lenoir, 'Science for the Clinic', p. 169.

[26] Carl Wunderlich, 'Introduction', *Archiv fur Physiologische Heilkunde*, no. 1. Cited in Faber, *Nosography*, p. 66.

dissolution. All attempts to describe diseases in terms equivalent to the genera, species, or natural varieties of plants or animals are, then, erroneous; they lead to mistakes both of theory and of practice, and to ignorance of the underlying unity in the various forms of disease.[28]

In 'Words and Things', Allbutt gave an analysis of how diseases were named and explained why they should not be seen as morbid entities. He used the idea of epilepsy as an example:

> In epilepsy, for instance, we observe a vast number of persons attacked in modes not identical but similar, modes, however, the features of which shade off by insensible transitions into the features of other groups of symptoms; so that our concept is not of an absolute but only of a relative uniformity. This we should remember when we use the name; as we remember that when we call a certain group of stars Orion, or Charles's Wain, that there is no rigid division between these star groups and those of the neighbouring constellations. Now epilepsy is no more an entity or an absolute idea than Orion; it is the name of an arbitrary group, so separated for the convenience of the thinking faculty of finite beings.[29]

Allbutt's idea was that what physicians perceived were signs, pathological states, figures from laboratory analysis or reports of symptoms from patients. Then what the physician did was to assign a name, say, 'epilepsy', to what he perceived. The important point was that first, the name 'epilepsy' did not refer to a physical object or a kind of thing. It was an abstraction formed in the physician's mind. It was a

[27] Rudolph Virchow, 'Die Einheisbestrebungen in der Wissenschaftlichen Medizin'. Cited in Faber, *Nosography*, p. 70.
[28] Allbutt, 'Introduction' (*A System of Medicine*), xxiv.
[29] Allbutt, 'Words and Things', p. 1122.

mental construction. As Allbutt said, "when we name a disease, we signify no 'morbid entity' – no thing – we signify a more or less indefinite abstract concept, each of us in his own mind".[30] Second, when Allbutt used the word 'arbitrary', he meant that the grouping of symptoms to construct the concept of a disease was contingent. This means that in principle it could be otherwise. With more advanced knowledge, the definition of a disease could be refined and it is possible that more and more diseases could be constructed or could be categorized in a new way according to new criteria. For example, Allbutt said that in the past the Arabian schools had formed a nosological system in which diseases had been classified according to their symptomatic resemblances. According to this principle, a specious group of pulmonary diseases had been formed. However, in Allbutt's time, bacteriologists classified diseases according to their etiological nature, so that pulmonary phthisis and pneumonia, together with other diseases unrelated to the lungs, were categorized as infectious diseases. Allbutt added that the latter categorization was superior because it was based on the experimental method that he regarded as truly scientific.[31]

It should be noted that, in Allbutt's account, the emphasis on contingency was very important. It showed that disease was an abstraction. It was not a physical entity. Allbutt's point was that there had been a habit of speaking of diseases as species. This linguistic habit, according to him, was mistaken.

Apart from the concept of disease, Allbutt also shared the physiological view that there is no distinction between pathology and physiology. Based on animal experiment, French and German experimental physiologists developed the view that there was no essential difference between physiological and pathological

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[30] Clifford Allbutt, 'Modern Therapeutics', *Practitioner*, 1920, part 2, p. 159.

phenomena. In their view, pathological phenomena were simply modified physiological phenomena and therefore pathology and physiology should be united. This is why the term 'patho-physiology' came into use in the nineteenth-century medical circle. In 'Progress of the Art of Medicine', Allbutt spoke highly of patho-physiology:

> I shall show...that the new study of pathology or *morbid physiology*, while revealing to us the modes of disease in the body, reveals likewise the ways in which we may meet or anticipate it...[32] (my italics)

In the 'Introduction' to *A System of Medicine*', Allbutt justified the unification of physiology and pathology as follows:

> ...the building up of an organism is not by permanent accretion like the building up of a house, but an incessant repair of decay, the student of the normal, that is the physiologist, is constantly in the presence of pathological features. As the healthy, so the normal is but a relative term; that which is normal in one series may be abnormal in another, and thus the physiologist and the pathologist are intimately one: physiology as well as pathology is concerned with decay.[33]

The parallels between Allbutt and the German medical writers indicate that Allbutt adopted his concept of disease from physiological medicine and that he regarded physiological conditions as the primary subject of medicine, which should be studied experimentally.

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[31] Allbutt, 'Introduction' (*A System of Medicine*), xx.
[32] Allbutt, 'Progress of the Art of Medicine', p. 37.
[33] Allbutt, 'Introduction' (*A System of Medicine*), xxiii.

3.2 Reformulation of the concept of disease as deviation from the normal into a new cognitive structure

Although Allbutt claimed that his concept of disease came from 'modern' pathology, he surely knew that the idea of disease as deviation from the normal had a long history and that its early employment can be traced back to Hippocrates (c. 450-370 BC), who regarded disease as an imbalance of humours. Galen (129-c. 216 AD), as medieval codification of his papers suggested, employed a Hippocratic theory of humours and concept of disease, although Galen is sometimes associated with an ontological view. Galen's followers elaborated his ideas after his death in about 216 A.D. His works were reproduced by Roman authors and were taught in medical schools. This further development of Galenic medicine continued for almost a thousand years and was known as Galenism. One of the most well-known Galenists was Rhazes, a Muslim physician and philosopher, who also employed the concept of disease as an imbalance of humours. Rhazes kept detailed notes on his therapies and pathological knowledge, copied useful passages from books he read and organized them.[34] These notes indicated that Hippocratic and Galenic medicine, including the concept of disease as imbalance, were integrated into medieval Arab-Islamic medicine.

The development of anatomical knowledge in the sixteenth century and the rise of the new science broke down the authority of Galenism. New medical systems, such as iatrochemtry, iatromechanics and animism, emerged. Some of these system-builders, such as iatrochemists and iatromechanists, opposed Galenic medicine.[35]

[34] Lawrence Conrad, 'The Arab-Islamic Medical Tradition', *The Western Medical Tradition: 800B.C.-1800A.D.*, Cambridge and New York, Cambridge University Press, 1995, p. 113.
[35] Andrew Wear, 'Medicine in Early Modern Europe, 1500-1700', *The Western Medical Tradition: 800B.C.-1800A.D.*, Cambridge and New York, Cambridge University Press, 1995, p. 359.

Despite this, the concept of disease as imbalance did not die out. It was, for example, preserved in John Brown's system.

Brown regarded life as a combat between the living organism and external agents and it was determined by the consumption of vital force, which originated in the nervous system and possessed a finite quantity of excitability.[36] Such a view implied that overabundance or exhaustion of vital force would cause disease or even death. In Brown's medical system, diseases were divided into two classes: sthenic and asthenic.[37] Sthenic diseases stimulated vital force and led the organism's body to an overexcited state whereas asthenic diseases depressed vital actions. Brown therefore reduced medical practice to two acts: stimulation and debilitation.[38] If a particular disease was sthenic, then the corresponding therapeutic act was to debilitate the vital actions. If the disease was asthenic, then the physician should stimulate the patient's vital actions.

According to Brown, different states of life were effects of the nervous system. The poles of health and disease were matters of degree or matters of excess and deficit. Physiological and pathological phenomena were therefore regarded as qualitatively the same but quantitatively different. These notions of health and disease were maintained by nineteenth-century thinkers, such as François Joseph Victor Broussais, August Comte and Claude Bernard.[39] Broussais regarded vital phenomena as a matter of excitation. He also put forward a thesis called 'Broussais's Principle', which was in fact a re-articulation of Brown's view. The principle said

[36] Georges Canguilhem, 'John Brown's System: An Example of Medical Ideology', *Ideology and Rationality in the History of the Life Sciences*, transl. Arthur Goldhammer, Cambridge and Massachusetts, The MIT Press, 1988, p. 42.
[37] Ibid., p. 43.
[38] Ibid.
[39] See Georges Canguilhem, *The Normal and the Pathological*, transl. Carolyn R. Fawcett, New York, Zone Books, 1989, ch. 1-3. It should be noted that Canguilhem was antagonistic to this 'Brownian' view. For his criticism, see *The Normal and the Pathological*, part 2.

that pathological states are those in which excitation deviates from the normal states and the former were merely quantitative modifications of the latter. All diseases, Broussais argued, consisted "in excess or lack of excitation in the various tissues above or below the degree established as the norm".[40] In other words, "diseases are merely the effects of simple changes in intensity in the action of the stimulants which are indispensable for maintaining health".[41]

Comte and Bernard also regarded disease as exaggerated or diminished expressions of the normal states.[42] This view of disease was also supported by German medical men, such as Virchow, Wunderlich and other advocates of physiological medicine. In short, the physiological concept of disease championed by Allbutt had a long history. It was characterized differently at different times but the central idea remained unchanged. In physiological medicine, it was reformulated as a new cognitive structure making it modern and scientific. This cognitive structure included the use of experiment to investigate physiological and pathological conditions; the use of graphical diagnostic methods; the use of statistics to define what was normal; and cellular pathology.

The cornerstone of physiological medicine was experimentation. Advocates of physiological medicine regarded experiments as the source of physiological knowledge and their status in physiological medicine as primary. Although Virchow was a pathological anatomist, he agreed that experiments were the most important part of physiological medicine since they answered questions raised by pathologists and clinicians:

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[40] Canguilhem, *The Normal and the Pathological*, p. 48.
[41] Ibid.
[42] Comte, in particular, regarded 'Broussais's Principle' as a general axiom and applied it to biological, psychological and sociological phenomena. See ibid., pp. 47-48.

> Pathological physiology takes its questions partly from pathological anatomy, partly from practical medicine; it creates its answers partly from observations at the bedside, and thus it is a part of clinical medicine, and partly from experiments on animals. The experiment is the ultimate and highest resort in pathological physiology.[43]

By using experiments in clinical medicine, medical scientists were able to form what they declared were empirically verified generalizations. For instance, when Ludwig Traube was in charge of a clinical department at the Charité Hospital in Berlin in 1856, he "developed his doctrine of variation in blood-pressure, and more especially of hypertonia as the cause of the cardiac hypertrophy" by means of experimentation.[44] Traube also applied the experimental approach to clinical thermometry and stimulated Wunderlich's interest in this subject. Eventually, Wunderlich demonstrated the typical temperature curves of various diseases in 1868.

From the 1860s onwards, physiologically-minded clinicians studied organic functions experimentally. This branch of study was known as functional diagnosis. In 1867, Adolph Kussmaul used the stomach pump to treat dilatation of the stomach associated with stagnation of its contents.[45] The use of the stomach pump stimulated further study of gastric diseases. In 1871, Wilhelm Leube conducted a series of experiments on digestion. He fed animals with different kinds and different amounts of food, giving their stomach different workloads and observing the effects produced. With these experiments, Leube demonstrated that there was sometimes a deficiency

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[43] Rudolf Virchow, 'Über die Standpunke in der Wissenschaftlichen Medizin'. Cited in Faber, *Nosography*, p. 68.
[44] Ibid., p. 73.
[45] Ibid., p. 117.

of acid in the stomach.[46] The acidity of the stomach juice thus became a subject of interest for physiologists.

New concepts were introduced to explain experimental results. In order to explain his experimental results on the motor movement of the stomach, Ottomar Rosenbach in 1878 introduced the term 'ventricular insufficiency', analogous to the term 'cardiac insufficiency' introduced by Theodor von Dusch.[47] By 'ventricular insufficiency', Rosenbach meant "the disproportion between the muscular power of the stomach and the amount of work demanded of it".[48] Rosenbach also introduced the idea of the latent reserve force, by which he meant the force which came into play when the demands upon the organs became greater than normal.[49]

Functional diagnosis was not limited to research on the stomach. The heart, the lungs, the liver and the kidneys were also studied. Christian Bohr developed functional diagnosis of the morbid condition of the lungs. Alexander von Korányi studied the power of the kidneys to increase the molecular concentration of urine. Secretary disturbances and various motor disturbances were studied by others.

The use of experiment made physiological medicine appear more like an 'exact' science. Experiments were widely used and were considered as necessary as in physics and chemistry, the exemplars of science. The imitation of the investigative mode of the exact sciences became a powerful means to enhance the scientific status of the junior subject. By the use of experiments, physiological medicine attained a higher degree of precision, like that of physics and chemistry. In the early nineteenth century, it was claimed that Paris medicine was a science because it was based on pathological anatomy. Yet, fifty years later, advocates of physiological medicine

[46] Ibid.
[47] Ibid., p. 120.
[48] Ibid.
[49] Ibid., p. 122.

criticized Paris medicine for lacking the experimental spirit and argued that physiological medicine was a genuine science. When Allbutt emphasized that patho-physiology was modern, he surely had in mind the idea that it was experimental and thus more scientific than contemporary English medicine, which was largely based on pathological anatomy and physical examination.

The use of the graphic method to produce accurate and objective records of physiological conditions was another means to make physiology more like an exact science. The graphic method was introduced to German physiology by Carl Ludwig, Hermann Helmholtz and Emil du Bois-Reymond, who were members of the 1847 group. This group also introduced into physiology physical concepts and the mathematical method because its members perceived the need for greater rigour to make physiology an exact science in the image of the physical sciences.[50] The kymograph, the first instrument for graphically recording body functions, was invented by Ludwig in 1847. The instrument allowed the measurement of the continuous variation of a quantitative value over very short time intervals.[51] It could produce curves whose height expressed, for example, blood pressure and whose width determined the time. In other words, it could produce a simultaneous measurement of amplitude and frequency. The curve expressed the values of an independent and a dependent variable. It, therefore, produced a general functional relationship. This made possible the application of mathematical analysis to physiological phenomena, which was one of du Bois-Reymond's ideals.[52]

Frederic Holmes and Kathryn Olesko argue that the graphic method represented a new standard of precision. This can be seen from Helmholtz's employment of it.

[50] Frederic L. Holmes and Kathryn M. Olesko, 'The Images of Precision: Helmholtz and the Graphical Method in Physiology', in M. Norton Wise (ed), *The Value of Precision*, Princeton (New Jersey), Princeton University Press, 1995, p. 201.
[51] Ibid.

When Helmholtz studied muscle action, he used both the graphic method, which could directly produce curves showing amplitude and frequency, and the 'Pouillet method',[53] which could not directly produce curves but could make more precise measurements than the graphic method. After comparing both kinds of presentations of results, Helmholtz preferred the graphic method because although it was less precise, its qualitative presentations of results possessed a higher demonstrative power.[54] Holmes and Olesko explain this view as follows:

> The greatest advantage of the method is that in each individual tracing of the two curves belonging together, one can immediately recognize from their form whether or not the muscles work in exactly the same way in both cases.[55]

Holmes and Olesko argue that Helmholtz's preference for the graphic method over the 'Pouillet method' can be seen as a shift from one form of precision to another "if we extend the meaning of precision to encompass not only exact quantitative measurement, but also 'strict expression' and 'exact definition' in a qualitative sense".[56] The graphic method made possible the recognition of patterns and rhythm; the interpretation of stages within a pattern; and a quick comparison of different measurements. None of these were directly achievable by the use of numerical expressions.

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[52] Ibid., p. 200.
[53] The Pouillet method was invented by the French physicist Claude Pouillet, who also invented the tangent and sine galvanometers, the first devices for measuring absolute current. In this method, Helmholtz made use of a sensitive galvanometer. When the muscle was stimulated, a galvanic current would be produced and it would cause the magnetic needle of the instrument to move. "'[T]he time during which a galvanic current of known intensity' passes through the windings of a sensitive multiplicator [galvanometer] 'can be calculated exactly by the changed motions' the current imparts to the magnetic needle of the instrument". "By this method he [Helmholtz] was able to measure with unprecedented precision 'the time that passes from the moment of the stimulus to the point at which the elastic force of the muscle reaches a definite value…'" (Ibid., p. 205)
[54] Ibid., p. 211.
[55] Ibid., p. 209.
[56] Ibid., p. 211.

From the mid-nineteenth century onwards, more graphic instruments were invented and their qualities were improved. Etienne-Jules Marey's sphygmograph and James Mackenzie's polygraph were good examples. While the stethoscope produced diagnostic signs private to the physician, and the interpretation of the morbid sound could be influenced by the subjective judgment of the physician, graphic instruments produced permanent and open records which allowed comparisons.[57] This, said their users, guaranteed objectivity and made medicine more scientific.

The use of medical statistics started from the mid-eighteenth century and statistics became one of the characteristics of hospital medicine. Representatives of hospital medicine, such as Pinel, Laennec, Jean-Nicolas Corvisart, Gaspard-Laurent Bayle and Pierre-Charles-Alexandre Louis, emphasized the importance of multiple case reporting and probabilistic thinking.[58] They used statistics to discover correlations between the occurrence of a disease and the corresponding signs, age, sex and occupation of patients and their death rates. However, the use of statistics to determine normality was very much a novel application by experimental physiologists.

Like the use of experiment and the graphic method, the use of statistics to determine normality also made physiology more like physics and chemistry, in which quantification was prioritised. With the use of statistics and the use of diagnostic instruments which produced numerical results, experimental physiologists began to quantify the idea of normality. They equated health with statistical normality. This concept, said experimental physiologists, could be used to indicate healthy and

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[57] Stanley Joel Reiser, *Medicine and the Reign of Technology*, Cambridge, London, New York and Melbourne, Cambridge University Press, 1975, p. 104.
[58] Bynum, *Science and the Practice of Medicine*, p. 43.

pathological conditions with objectivity, and this would make physiology more like other natural sciences.

Another important component of the cognitive structure of patho-physiology was cellular pathology, established by, among others, Virchow. While Bichat located the seats of diseases in the tissues and Johann Reil argued that fibres were the basic structural units which made up tissues and organs, Virchow transferred the locus of life and disease to the cells.[59] The theory of cells was nothing new when Virchow published his book *Cellular Pathology, as Based upon Physiological and Pathological Histology* in 1858. Theories of the structure and the genesis of the cell had been proposed by Matthias Jacob Schleiden, Theodor Schwann and others. Nor was the idea that disease processes were ultimately cellular Virchow's original suggestion.[60] However, Virchow was original in combining the physiological concept of disease with the cell theory and systematically applying cellular pathology to examination of various diseases. Based on the view that disease was modified life, he argued that the diseased cell was the changed condition of the normal cell, and not a cell of utterly different essence.[61] He applied cellular pathology to the examination of inflammation, tumour growth and degenerations and he generated new interpretations of these processes.[62]

Although Virchow's cellular pathology was built upon the theory of others, he disagreed with his predecessors and contemporaries in some details. For example, Schwann held that cells were formed from a kind of organic crystallization out of a structureless fluid, 'cytoblastema'. Virchow, however, argued that cells arose from

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59 Lelland J. Rather, 'Introduction: The Place of Virchow in Medical Thought', *Cellular Pathology: As Based Upon Physiological and Pathological Histology*, New York, Dover Publications, 1971, xv.
60 William Coleman, *Biology in the Nineteenth Century: Problems of Form, Function, and Transformation*, New York and London, John Wiley and Sons, 1971, p. 32.
61 Ibid., p. 33.
62 Esmond R. Long, *A History of Pathology*, New York, Dover Publications, 1965, p. 122.

other cells.[63] Although Vichow, like Bichat, was a pathological anatomist and concerned about the anatomical seats of diseases, he emphasized that pathological anatomy was merely one component, though an important one, of patho-physiology. He regarded experimentation as the most important component. Virchow was never satisfied with the static and descriptive aspects of pathological anatomy. In 1898, he reminded the members of the German Society of Pathology that "their task was to become pathologists and not remain anatomists, and to elucidate pathological processes rather than merely anatomical states".[64] In short, cellular pathology created a new approach to the analysis of disease, which made considerable use of experiment, microscopic observation and microscopic anatomy.

To sum up, Allbutt's concept of disease had a long history and was characterized differently in different times. In the nineteenth century, it was reformulated in a new cognitive framework and was made, as its proponents said, scientific. Related the old idea was the notion of natural healing power, which was also discussed by Allbutt in 'Progress of the Art of Medicine'. Below, I elaborate this notion.

3.3 Allbutt's account of the healing power of Nature

In 'Progress of the Art of Medicine', Allbutt said that the human body was a system of force which tended to recover its equilibrium when disturbed. The modern physician, he said, was "minister, non magister naturae"[65], who would assert that "the body and its functions are thrown off equilibrium, and it is not for me to expel or counteract this or the other, but to put the body in such a position that it may most quickly recover its own balance".[66] This remark suggested that Allbutt accepted the

[63] Rather, 'The Place of Virchow in Medical Thought', xii.
[64] Ibid., xxi.
[65] Allbutt, 'Progress of the Art of Medicine', p. 38.
[66] Ibid.

idea of the healing power of nature, which means that an organism will tend to heal itself naturally when it is diseased or injured. Like the physiological concept of disease, the notion of natural healing process had a long history.[67] In ancient times, the notion was widely accepted and physicians were regarded as "minister naturae" whose task was to monitor the natural healing process and to provide assistance when necessary. This kind of medical practice was called 'expectative medicine'.[68] It is important to note that when Allbutt discussed the physician's role he was using the language of expectative medicine. In his view, the physician should play a subsidiary role in the healing process, as minister of nature, whereas the main role should be left to nature.

Max Neuburger has convincingly argued that the notion of natural healing power was adopted by various medical men in the history of medicine, such as Hippocratic writers, Galen, Rhazes, Paracelsus, Friedrich Hoffmann, Christoph Wilhelm Hufeland, Johann Christian Reil, Wunderlich, Virchow and others. It is interesting to note that among these people, some adopted the morbid entity view of disease and some adopted the physiological view. Correspondingly, their characterizations of the natural healing power were also different. For example, Paracelsus regarded a disease as a parasite and held that the 'archeus', the internal physician of the body, would initiate a fight against the disease.[69] In his view, the archeus was a purposive principle aiming to conquer disease entities.

In contrast with Paracelsus, other medical thinkers such as Christoph Wilhelm Hufeland, Johann Christian Reil and nineteenth-century advocates of physiological medicine argued that the natural healing power is not a special kind of thing. For

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[67] See Max Neuburger, *The Doctrine of the Healing Power of Nature Throughout the Course of Time*, transl. Linn J. Boyd, New York, Publisher Unknown, 1932.

[68] This term is used by Neuburger throughout his book, *The Doctrine of the Healing Power*. See, for instance, p. 42 and 82.

supporters of physiological medicine, the power was a manifestation of metabolic forces, responsible for growth and metabolic processes. Wunderlich, for instance, held that the natural healing forces were the same as the living forces working in healthy life.[70] Whether they were curative depended on whether the organism had a disease.[71] Virchow also held that the natural healing power was not a special power but simply "the manifestation of a general developmental law".[72]

It is important to note that Allbutt agreed with Wunderlich and Virchow on the nature of the natural healing power. In Allbutt's view, the natural healing power was not a purposive entity which fought against diseases. It was a reactive living force which restored the equilibrium of bodily functions.

Several passages in Allbutt's writings support the above view. For instance, in his early paper 'On "Optic Neuritis" As a Symptom of Disease of the Brain and Spinal Cord' (1868), Allbutt analysed the concept of optic neuritis. He claimed that the term meant "inflammation of the optic trunk" and the word 'inflammation' should be defined as "lesion with reaction or resistance".[73] Resistance (to the lesion), said Allbutt, manifested itself in various ways depending on the conditions and the complexity of the ruptured (injured) issue. If the lesion was surrounded by vascular and nervous connexions, there would not only be cellular resistance, but also nervous and vascular resistance; and proliferation, congestions, and heat in various degrees would also be observed. "And yet," Allbutt remarked, "all severe congestions of the optic disk, with their consequent effusions, are called optic neuritis!"[74] This indicated that optic neuritis was a sign that the body was healing an optic lesion. Allbutt's most

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[69] Ibid., p. 26.
[70] Ibid., p. 179.
[71] Ibid.
[72] Ibid., p. 180.
[73] Clifford Allbutt, 'On "Optic Neuritis" As a Symptom of Disease of the Brain and Spinal Cord', *The Medical Times and Gazette*, 1868, i: 521.

important message in this analysis was that the healing force (the resistance) was a reactive living force, not a purposive entity:

> The truth is, we cannot shake off our ontological conceptions of a "nature," an entity, I believe, of the female gender, *who is always planning something in the human body*-"eliminating morbid poisons," plugging up inappropriate perforations, "setting up inflammatory actions," and so on. It is really time we *avoided all this reasoning from final causes*, and that we sincerely regarded the functions of tissues as the evidence of an equilibrium mobile which possess greater or less power of resistance according to its tension, and which manifests such resistance variously according to its complexity.[75]

In 'Progress of the Art of Medicine', Allbutt asserted that the role of the physician was not to expel or combat a morbid entity from the patient's body, but to provide the conditions for the body to recover its equilibrium:

> Modern pathology tells us that, when we have to treat disease, we have not to neutralize or eliminate humours, nor to expel evil spirits, but to disencumber, as far as we can, that regulating power which the body by nature has to so wonderful a degree. Like all systems of force, the human body, when disturbed, tends to recover equilibrium, and it is for modern medicine to show how this tendency may be detected and set free to act without hindrance.[76]

Allbutt argued that understanding the idea of functional equilibrium and its restoration would actually affect a physician's treatment in practice. One of his examples was hypertrophy of the heart.

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[74] Ibid.

> Hypertrophy of the left ventricle in aortic disease and of the right ventricle in mitral disease is now no longer feared, but rather welcomed, by the physician, who has learned that these hypertrophies are compensatory, and tend to the restoration of equilibrium.[77]

In physiological medicine, the enlargement of the muscle fibres of the heart was a natural healing process. In the cardiac pathology of Paris school, which was based on pathological anatomy and physical examination, cardiac disorders were seen as structural problems.[78] Therefore, hypertrophy of the heart might be regarded as a problem because it was a structural change. However, experimental physiologists focused their attention on the functions rather than the structure of an organ. In patho-physiology, only functional failures would be regarded as disorders. A change of structure, as long as it did not reduce the functional capacity of an organ, was not considered pathological. If a structural change could improve the functions of an organ, physiologists would welcome it.

In this example, hypertrophy of the ventricles was welcomed because physiologists found that the enlargement of the muscle fibres of the heart in aortic and mitral diseases maintained the normal functional capacity of the heart. It was compensatory and indeed beneficial to the patient's health. Whereas physicians of the Paris school might intervene in hypertrophy, for it was seen as a structural change, physiological-minded physicians would do nothing. This is how differences in the concept of disease would lead to differences in the method of treatment.

Another example is the treatment of fever:

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[75] Ibid.
[76] Allbutt, 'Progress of the Art of Medicine', p. 38.
[77] Allbutt, 'Progress of the Art of Medicine', p. 38.
[78] Christopher Lawrence, 'Moderns and Ancients: The "New Cardiology" in Britain 1880-1930', in W. F. Bynum, C. Lawrence and V. Nutton (eds), *The Emergence of Modern Cardiology*, London, Wellcome Institute for the History of Medicine, 1985, (*Medical History*, Supplement no. 5), p. 6.

> The modern physician, who is no longer bent upon the elimination of morbid poisons from the blood, will no longer treat scarlet fever, let us say, by promoting the action of the skin and calling upon the evil in the shape of the rash, but he will deliberately prop up the equilibrium mobile on the side to which it leans, and, by the vigorous and repeated application of cold water, he will help the regulating action of the system which is unequal to the disturbance.[79]

The principle of the restoration of balance, said Allbutt, also applies to kidney diseases:

> In disease of the kidney, for example, it may be a matter of serious consideration whether, in a given case, we shall endeavour to set up an artificial balance by drawing off the urinary products by other channels, or whether we shall attempt to restore the natural balance by a judicious use of diuretics.[80]

All this cumulates in the message that Allbutt regarded the natural healing power as a reactive regulatory force and that the physiological concept of disease implied a different method of treatment from that of the Paris school which saw diseases as morbid entities.

4 Allbutt's criterion of a scientific concept of disease

Allbutt adopted the physiological concept of disease because he considered it scientific. In this section, I examine his criterion of a scientific concept of disease with reference to his appreciation of Jean Martin Charcot's work on hysteria. I also explore Allbutt's attitude towards the relation between religion and medicine. Given

[79] Allbutt, 'Progress of the Art of Medicine', p. 38.

Allbutt's admiration of August Comte's positive philosophy (as discussed in chapter one), I also examine whether Allbutt's view of disease can be fitted into Comte's three-stage characterization of the development of ideas. Finally, I discuss George Henry Lewes' criticism of Charles Darwin's misuse of figurative language. I suggest that there are parallels between Lewes' criticism and Allbutt's strictures on the morbid entity view.

Charcot is regarded as one of the most famous French neurologists and pathologists, notably because he naturalized the concept of hysteria. In ancient medicine, hysteria referred to a disease of the womb. By definition, it was regarded as a female condition. In the seventeenth century, it was regarded as a problem of the nervous system. This implied that the disease could also occur in men. However, this view did not last long. The revival of gynaecological theories in the late eighteenth and early nineteenth century reinforced the ancient idea that there was a peculiar relationship between hysteria and women. Hysteria, doctors agreed, could be a most confusing illness because it might cause convulsions, paralysis and blindness, which were also symptoms of other diseases. Some believed that it was a form of daemonic possession or religious ecstasy.

The daemonic character of hysteria was denied by Charcot. In 1870s, the neo-Napoleon regime in France was overthrown and the Third Republic was established. One characteristic of the Third Republic was that it was hostile to the Catholic Church, religion and superstition. The Republicans hoped that their new empire would allow a greater degree of openness in educational and scientific initiatives.[81] However, this was strongly opposed by the Catholic clergy who were aware of the

[80] Ibid.

[81] Ruth Harris, 'Introduction' in Jean Martin Charcot's *Clinical Lectures on Diseases of the Nervous System*, London and New York, Routledge, 1991, xvii.

increasingly materialistic bent of research in life sciences.[82] Charcot was a supporter of the Third Republic and an anti-clericist. He wanted to show that hysteria was not supernatural and that it was common in men. From his research in the history of mental disease, he argued that "the visions and ecstasies of saints in past ages were nothing more than undiagnosed hysteria".[83] From his diagnoses of numerous mental patients housed in the Infirmary of La Salpêtriére, Charcot concluded that hysteria was a kind of degenerative disease and its primary cause was the inheritance of "a latent flaw or defect of the nervous system"[84]. The common secondary cause in female hysteria was overpowering emotional experience whereas in male hysteria it was alcoholism and physical trauma in the workplace.[85] To show that hysteria was not peculiar to women, Charcot emphasized the diagnoses in his male patients. He also made this strange disease 'manageable' by means of class demonstration, hypnotism, and the manipulation of hysterogenic zones. Although he failed to locate organ lesions in his patients by means of morbid anatomy, he asserted that such lesions existed and could have been shown by more advanced technology.

Allbutt and Charcot became friends when Allbutt studied for his post-graduate degree in Paris. Allbutt was also the author of Charcot's obituary in *The British Medical Journal*, in which he spoke highly of Charcot's work on hysteria and recollected the valuable experiences that they had had together. Knowing that Charcot's approach to investigating neuroses was criticized as radical, Allbutt made the following positive comment on Charcot's work:

> Undisturbed by remonstrance or ridicule, unshaken by the giddy agitation of the mesmerists, heedless of the flatteries of the gossips,

[82] Ibid.
[83] Ibid., xix.
[84] Mark S. Micale, 'Charcot and the Idea of Hysteria in the Male: Gender, Mental Science, and Medical Diagnosis in Late Nineteenth-Century France', *Medical History*, 1990, xxxiv: 382.

> Charcot steadily pursued his investigations in hysteria and other neuroses as if the Salpêtriére and himself were in Saturn.[86]

Allbutt's appreciation of Charcot's research on hysteria was owing to the latter's naturalization of the disease. From Allbutt's point of view, Charcot freed hysteria from religious implications. In 'The Relationship between Medicine and Religion', an introductory essay to *Medicine and the Church* edited by Geoffrey Rhodes in 1910,[87] Allbutt made the following remark:

> Now a careful study of all reported cures of this miraculous or miraculoid kind, a study illustrated for us many years ago by Charcot, proved to him, and proves to the expert observers of to-day, that they all – palsies, convulsions and the rest, often inveterate cases–are and have been cures of one disease, and of one only, namely hysteria; a malady which in its protean manifestations mocks all and any particular diseases.[88]

Medicine and the Church had two themes: (1) to attack Christian Science, which was a popular religious doctrine in early twentieth-century America and England, whose advocates claimed that they treated numerous patients purely by religious means; (2) to describe how a co-operative relationship between medicine and the church could be maintained. Rhodes invited Allbutt and others to contribute a number of articles to the book.[89] Rhodes undertook the first part of the introduction. Allbutt, Sydney

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[85] Ibid.
[86] Clifford Allbutt, 'Obituary for J.M. Charcot', *The British Medical Journal*, 1893, ii: 496.
[87] Geoffrey Rhodes is also the editor of *The Mind at Work: a Handbook of Applied Psychology* (London, Thomas Murby, 1914).
[88] Clifford Allbutt, 'The Relationship between Medicine and Religion', *Medicine and the Church*, Geoffrey Rhodes (ed), London, Kegan Paul, Trench, Trubner & Co., Ltd, 1910, p. 36.
[89] There are several articles in *Medicine and the Church*, including 'Medicine and Religion' by Charles Buttar (London General Practitioner, Chairman of the Executive Subcommittee of the Central Medical War Committee); 'The Patient' by Stephen Paget (Aural Surgeon and later Consulting Surgeon to the Middlesex Hospital, and pro-vivisection campaigner); 'The Relation of Priest and Doctor to Patient' by Jane Walker (a physician; specialist in the open-air treatment of tuberculosis; the founder of the East Anglian Sanatorium, Maltings Farm Sanatorium and the East Anglian Children's Sanatorium); 'Faith and Mental Instability' by Theophilus Bulkeley Hyslop (Senior Physician to

Holland and an anonymous fellow of the Royal College of Surgeons were responsible for the second part.[90] In his introduction, 'The Relationship between Medicine and Religion', Allbutt emphasized the separation between religion and science. He held that religion was responsible for the spiritual aspect of life and medicine for the material aspect. Illness, in his view, was definitely a material issue and should not be confused with a religious one:

> In our interesting personal conversation you [Rhodes] may remember that I expressed the opinion that, on the whole, our prayers must not be for material but for spiritual things. And, speaking on the whole, sickness is a material thing...I can only now say that disease is a material effect to be combated by material means, and not by religious processions or intercessions.[91]

Based on such a distinction, Allbutt interpreted the 'miraculous cures' mentioned in historical texts as cases of 'cure by suggestion":

> The 'miraculous cures' then, so far as they are genuine, are cures by suggestion: they take their place with cures of the same kind of disorder by panic, such as alarm of fire; by 'hypnotism', or by any other over-mastering impression which startles or transports the

Benthelem Royal Hospital and Lecturer on mental diseases at St. Mary's Hospital); 'Our Lord's Attitude towards Sickness' and 'The Principles of Modern Christian Healing' by W. Yorke Fausset (a prebendary and the author of *The Values of the Cross or the Things That Matter*); 'The Eucharist and Bodily Well-Being' by Arthur William Robinson (Assistant Secretary to the Imperial Conferences and Secretary of the Royal Commission on the Dominions); 'Prayer and Mental Healing' by Arthur Chandler (Bishop of Bloemfontein); and 'The Metaphysics of Christian Science' by M. Carta Sturge (a writer, the author of *The Psychology of Attention*, *Theosophy and Christianity* and *Truth and Error of Christian Science*); 'Medical Aspects of Mental Healing' by Hector Graham Gordon Mackenzie; and 'The Church and Mental Healing' by Ellis Roberts.

[90] Sydney Holland was a hospital administrator and reformer; also had been Chairman of the London Hospital.

[91] Allbutt, 'The Relationship between Medicine and Religion', pp. 34-35.

balance of the bodily functions from one centre of equilibrium to another higher and more stable one.[92]

While accepting that religious healing had its effects, Allbutt denied that the effects came from supernatural influences. Rather, the effects were psychological and, if used properly, could be very helpful to the physician's treatment.

Allbutt was a scientific naturalist. In his discussion of disease, he often used scientific language popular in his time, such as 'transports the balance of the bodily functions', 'centre of equilibrium' and 'energy'. As shown in chapter two, Allbutt employed the idea of tension (by which he seemed to refer to a form of energy) to describe the functions of the nervous system in 'Medical Thermometry' (1870). Forty years later, his naturalist position remained the same. When he described in the 'Introduction' the melancholy, debility and disappointment that someone experienced in fatal diseases, he said that "energy was wasted which is solely required for the conflict with disease"[93] and therefore the priest became crucial in bringing the patient's mind to peace. It seems that, for Allbutt, prayers had no supernatural effect in a healing process; they only saved the wasted energy. Such a characterization of the healing effect of prayers suggested that, for Allbutt, diseases belonged to the material world rather than the spiritual world.

To reconcile the potential conflict between medicine and religion, Allbutt argued that the first thing to do for the sick was not to pray, as Christian Scientists did, but to seek the physician's help and this was indeed according to God's Will.[94] For illness

[92] Ibid., p. 36.
[93] Ibid., p. 38.
[94] My interpretation of Allbutt's view is that Allbutt believed in God. However, he held that the secular world was ruled by natural laws designed by God. Operational problems of the secular world should be solved by science. Religion was responsible for spiritual issues, of which science was not in charge. (Allbutt did not specify what he meant by 'spiritual issues'. I think they included moral issues and faith in the after-life.)

was a physical matter, which could not be helped by religious rituals that sought to invoke divine power. To explain this, Allbutt gave the following example:

> For instance, the father seeing his child in diphtheria would please God better – so the experience of His world tells us – by spending his first hour in seeking the physician with his antidote rather than in prayer for a divine intervention. And when time came for prayer he would pray not for a suspension of natural law but for unity of his own will with that of the Father, and for the child's spiritual welfare.[95]

Allbutt's writing seems to suggest that he was not a devout Christian. However, he was. Rolleston, Allbutt's biographer, described Allbutt's attitude towards religion as follows:

> Allbutt was humble and deeply religious, but so reticent in this respect that many who thought they knew him well had not any acquaintance with this side of his life. Though bred up in the atmosphere of the Church, his early years of manhood and impression-ability were characterized by much controversy on the relations of religion and science, stimulated by the appearance of Charles Darwin's Origin of Species (1859). But, in spite of the difficulty, greater then than before or since, and of his eminence in medical science, which has so often exerted an influence in the direction of materialism and agnosticism, he remained unshaken in his faith.[96]

Rolleston's description was consistent with others. In a sermon on March 1925, J. W. Hunkin said that "among the religious he [Allbutt] stood for scientific method: among scientist for religious faith", and that "no man ever came nearer to the ideal of

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[95] Allbutt, 'The Relationship between Medicine and Religion', p. 35.

what a Regius Professor of Physic should be in a University like this".[97] Bishop Talbot described Allbutt as one "who with his great scientific strength combined, and was at pains to show that he combined, a strong and simple faith in the Divine ordering".[98]

Allbutt's distinction between medicine and religion was highly relevant to his concept of disease.[99] For him, a scientific concept of disease should be free from any religious perspectives. In short, Allbutt's appreciation of Charcot and his view of the relation between religion and medicine indicated that the separation of the concept of disease from religious beliefs or supernatural attributes was necessary for establishing a scientific medical language. To regard disease as a daemonic entity was to stay at the *theological stage*, in August Comte's terms. In nineteenth-century orthodox English medicine, although disease was no longer considered related to supernatural influence and was instead regarded as a specific and embodied morbid entity, Allbutt held that such an approach was still far from being scientific. For it was simply a manifestation of the *metaphysical stage*, in which the 'entitiness' of

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[96] Humphry Davy Rolleston, *The Right Honourable Sir Thomas Clifford Allbutt*, London, Macmillan and Co. Limited, 1929. p. 227.
[97] Cited in ibid.
[98] Cited in ibid., p. 228.
[99] This distinction seems not uncommon in the early twentieth century. Many writers in *Medicine and the Church* shared Allbutt's view. For instance, in his article, 'Medicine and Religion', Charles Buttar claimed:

> The main function of the minister of religion should be concerned with what is called the spiritual side of man, and not with purely material conditions, such as disease...In dealing with phenomena as specific as diseases, the Church must be prepared to accept scientific explanations. It is useless to complain of the materialism of doctors in connexion with material physical disorders...It is not unlikely that the effects of spiritual healing will prove to be merely results of a form of suggestion. (Charles Buttar, 'Medicine and Religion', *Medicine and the Church*, p. 65.)

Moreover, Sydney Holland held that the clergyman could help the patient (only) by "administering suggestions of hope and encouragement". Although Holland held that such "quieting and encouraging influences of religion" were very effective, he did not claim that prayer was sufficient for curing a disease. (Sydney Holland, 'Religion and Medicine at the Hospital', *Medicine and the Church*, pp. 44-45.) Echoing Allbutt's claim that religious healings were cures by suggestion, Jane Walker, the author of 'The Relation of Priest and Doctor to Patient' asserted that "[s]piritual Healing may be defined as a change in a person's point of view...Spiritual Healing can only, in quite a secondary way, be a physical process." (Jane Walker, 'The Relation of Priest and Doctor to Patient', *Medicine and the Church*, p. 99.)

disease was wrongly abstracted from signs and symptoms. This was a misuse of figurative language and unnecessarily granted a kind of existence to disease. Hence, Allbutt's advocacy of the concept of disease as deviation from the normal, which was employed by experimental physiologists who were establishing their discipline as an exact science. This can be understood, in Comte's language, as a step towards *positive science*. This move was not merely conceptual, it also influenced the method of treatment (as discussed in the last section). In Allbutt's view, although, technologically speaking, late nineteenth-century English medicine was not too far behind Germany and France, at the conceptual level it was still unscientific. To argue that the use of medical language would shape people's concepts and to illustrate the harm done by the misuse of language, in 'Words and Things', Allbutt cited Plato's saying in the *Phaedo* that "false words are not only in themselves evil but infect the soul with evil. So in science they infect the understanding".[100] Thus, the issue of the concept of disease and technological advance were equally important.

It is important to note that George Henry Lewes, Allbutt's life-long friend and an associate of Comte and several German scientists, was also very critical of the misuse of language. Before I end this section, I discuss Lewes' criticism of a particular misuse of language, as he conceived it, in Darwin's writing.

Lewes was a supporter of the Darwinian theory of evolution. However, he was also very critical of the details of Darwin's theory. In his book, *The Physical Basis of Mind*, published in 1877, Lewes criticized Darwin for conceptual confusions in his characterization of natural selection. In a discussion of the colours of the grouse, Darwin said that "Natural Selection might be most effective in *giving* the proper

[100] Allbutt, 'Words and Things', p. 1124.

colour to each kind of grouse, and in *keeping* that colour when once acquired".[101] Lewes argued that Darwin mistakenly regarded natural selection as a causal agent which could 'act on' organisms. Lewes held that natural selection was "simply the metaphorical expression of the fact that any balance of the forces which is best adapted for survival will survive"[102] and "is not a cause, or condition, of variation, it is the expression of variation".[103] Darwin, concluded Lewes, was trapped by the use of figurative language.

Lewes added that sometimes Darwin knew that he was using natural selection metaphorically as a causal agent to explain variations. "Mr. Darwin", said Lewes, "is at times explicit enough on this head: 'It may metaphorically be said that Natural Selection is daily and hourly scrutinising throughout the world the slightest variations...'"[104] However, Darwin sometimes claimed that natural selection was a causal agent. This was why Lewes said, "the metaphorical nature of the term is not always borne in [Darwin's] mind", and "Mr. Darwin's language...is misleading".[105] Lewes' criticism, I think, paralleled Allbutt's strictures on the idea of disease as a morbid entity.

There are other occasions in which such a parallel was evident. For instance, in his article, 'Mr Darwin's Hypothesis', Lewes emphasized that species was an idea, not a thing: "[v]ery important is it to bear in mind that Species is a subjective creation having no objective existence: it is an idea, not a thing; a systematic artifice, not a living entity".[106]

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[101] Charles Darwin, *Origin of Species*, 5th ed, (page number unknown). Cited in George Henry Lewes, *The Physical Basis of Mind*, London, Kegan Paul, Trench, Trubner, & Co. Ltd, 1893, p. 108.
[102] Ibid., p.106
[103] Ibid., p.108
[104] Charles Darwin, *Origin of Species*, 5th ed, p. 96. Cited in ibid.
[105] Ibid.
[106] George Henry Lewes, in Rosemary Ashton (ed), *Versatile Victorian: Selected Critical Writings of George Henry Lewes*, Bristol, Bristol Classical Press, 1992, p. 304.

In 'Words and Things', Allbutt made a similar claim to Lewes':

> ...some of you who have heard my teaching before must forgive me if I repeat my insistence that the name of a disease is not, as is continually regarded, a *thing*. There is *no such thing* as typhoid fever, as angina pectoris, as spleno-medullary leukaemia, and so forth; the things so called are Wilkinson, Johnson, and Thompson, who after their kinds are afflicted not alike, but within such limits of similarity as to lead us to class them together and to form a general conception of them.[107] (my italics)

It should be noted that the diction in Lewes and Allbutt's criticisms was similar. Both claimed that the confusing metaphorical expressions in question did not refer to 'things'. This is not surprising because Allbutt was widely read in Lewes' works.[108]

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[107] Allbutt, 'Words and Things', p. 1122.

[108] I cannot find Allbutt and Lewes' correspondences. They are not included in William Baker's edited volume of *The Letters of George Henry Lewes*, (Victoria (British Columbia), English Literary Studies, University of Victoria, 1995). Nor are they available in the George Eliot and George Henry Lewes Collection at Beinecke Rare Book and Manuscript Library of Yale University. Despite this, I found in this collection four of Allbutt's letters to George Eliot which suggests that Allbutt had a deep understanding of Lewes' physiological work and spoke highly of it. For instance, in the letter dated 6th April 1879, Allbutt described Lewes' intellectual influence as follows:

> No book won our young students like the Physiology of Common Life: many of the ablest of them have said to me, "Physiology was a new thing to me from the day I read Lewes". (Clifford Allbutt, 'Letter to George Eliot, 6th April 1879', MS Vault Eliot box 6 f., 2004-1136-m., The Beinecke Rare Book and Manuscript Library, Yale University Library.)

The reason for this appreciation, Allbutt explained, was that Lewes was a gifted 'interpreter' of nature.

> ...it was something in his development of the 'idea' [of presenting physiological knowledge]. On turning to his other writings I seem to realize it as a power of 'presentation'-the power of instinctively true selection from a vast heap of facts those which are fruitful and essential...He showed the insides of things. After all science like nature is not impersonal and exists for us only in interpretations. He was an 'interpreter' and there is the kind of difference between Mr Lewes' teaching and another's that there is between an anatomical diagram issued by a government department and an anatomical sketch by M. Angelo [Michael Angelo]. The former is more valuable as a standard but the latter reveals the life of the whole. Both are accurate but one is dead accuracy, the other by an increasing instinct of selective handling emphasizes the essential in a few strokes. (Ibid.)

Allbutt's comment indicated that he understood Lewes' thinking very well. It also revealed Allbutt's ideal mode of the teaching of the biological sciences, i.e., to study the living whole. This notion was consistent with Allbutt's advocacy of physiological medicine in England and his biological and

In short, this parallel suggests that Allbutt's critical attitude towards the figurative use of language was not idiosyncratic. It might be shared by those who knew German and had a strong background of German life sciences.

5 Allbutt's use of history

Allbutt was a medical historian. His historical work was often used to advocate a scientific medicine. Conversely his medical writings often employed historical examples to support or illustrate his scientific ideas.[109] For instance, in 'Progress of the Art of Medicine', he spoke highly of Hippocrates because the idea of disease as imbalance of humours was, he emphasized, the precursor of the modern physiological concept:

> Medicine must profess to depend upon a knowledge of disease, and useful medicine must depend upon such knowledge of disease being approximately true. Nothing could have been more promising than the earliest important attempt of this kind in the west. Hippocrates and the Greek school dealt with the question in the simple, clear-eyed manner so characteristic of that wonderful people. The Hippocratic school believed that disease consisted in the exquisite combination of four humours. They did not hold he common coarse humoral pathology of which I shall presently speak; they did not contemplate the admixture of four liquids or juices, but rather the perfect balance and union of four "substances" or hypostases...[110]

evolutionist approach to comparative pathology that I shall discuss in the next chapter. In short, these parallels suggest that Allbutt might be influenced by Lewes.

109 See for instance Allbutt's 'Words and Things', 'Progress of the Art of Medicine' and 'Medicine and the People'.

110 Allbutt, 'Progress of the Art of Medicine', p. 38.

Allbutt drew parallels between Hippocratic medicine and modern science. The theory of humours, he claimed, was comparable to the theory of four elements in modern chemistry:

> Without much confusion of thought, we may venture to compare this theory [the theory of humour] with the modern chemical doctrine of the four elements, hydrogen, oxygen, carbon, and nitrogen. This conception, at any rate, was clear in their minds – the conception of a perfectly harmonious combination of constituent elements, and not a mere intermingling of fluxes and juices.[111]

Here I do not criticize or justify this parallel. The historical import of this episode is that Allbutt possessed the rhetoric skill to justify the ancient with reference to the modern, or the other way around. In fact, a broader examination of Allbutt's writings reveals that he often presented Hippocrates as a symbol of wisdom and insight. Hippocratic medicine, Allbutt frequently argued, was superior to other ancient medicines and therefore its characteristics should be revived. In this section, I shall 'dissect' Allbutt's most important historical work, *Greek Medicine in Rome*. I analyse in detail how Allbutt used Hippocrates to justify the advocacy of scientific medicine which emphasized the use of theory, observation and experiment.

In *Greek Medicine in Rome*, Allbutt spoke highly of the Ionian thinkers and called them 'prophets' and 'sages'.[112] Like other Cambridge men in his time, Allbutt regarded the Ionian thinkers as the inventors of science.[113] According to him, primitive Roman medicine was dominated by folk medicine which employed a great

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[111] Ibid., pp. 37-38.

[112] Allbutt, *Greek Medicine in Rome*, pp. 74-130.

[113] By the late nineteenth century, the notion that early Greeks, the Ionians, had invented science had become a dogma at Cambridge University. In Allbutt's time, such a view was commonly assumed, not only in the philosophy department, but also in science departments at Cambridge University. Thus, when Allbutt claimed that the Ionians were scientific, he was not saying anything particularly original.

deal of magic, myth and legend. The Ionian thinkers encouraged a scientific outlook in Roman medicine by theorizing the happenings of nature. They conceived a primary substance, which made up the cosmos, and natural principles, which governed the workings of that cosmos. For instance, Thales, according to Allbutt, was "the leader of those Ionian sages who first conceived a natural cosmogony independent of fable and supernatural machinery; an evolutionary cosmos originating in primary endowments of matter or substance".[114] This naturalized and evolutionary cosmology was adopted by other Ionian thinkers such as Anaximander, Anaximenes and Heraclitus. Each had his own proposal of what the primary substance was. Moreover, the Ionians, as Allbutt noted, anticipated most of the important modern scientific achievements. For example, Parmenides held that "the scheme of things was one of fullness and permanence, to be consummated in the one *immutable* Being".[115] This theory implied that nothing was either generated or destroyed. Allbutt added that "so in a sense it was Parmenides who postulated a doctrine of the conservation of matter".[116] Another instance was Empedocles. Empedocles, Allbutt said, anticipated the theory of evolution: "As a biologist, he taught that the beginnings of life lay in undifferentiated substances, which were gradually differentiated into species of which the fittest survived".[117] Besides, Empedocles's theory of matter prefigured the Daltonian theory, Allbutt said. Other Ionian anticipations included Leucippus and Democritus's atomic ideas, and Pythagoras's mathematics.[118]

Allbutt often juxtaposed the Ionian thinkers' ideas with modern scientific theories. This made the Ionian ideas look greater than those of contemporary

[114] Allbutt, *Greek Medicine in* Rome, p. 87.
[115] Ibid., p. 91.
[116] Ibid.
[117] Ibid., p. 101.

cultures such as those of the Athenians and the Etruscans. The point Allbutt wanted to make was clear: history taught that the Ionian culture was great because the Ionian thinkers carefully observed natural phenomena, speculated on the causes of the phenomena, tested their hypotheses through practice, and mathematized the world. These characteristics, according to Allbutt, were exactly the ones required by scientific medicine.[119]

With regard to medicine, Hippocrates was made into a hero by Allbutt.[120] Hippocratic medicine, as Allbutt characterized it, possessed a scientific and rational character.[121] Allbutt said that this character was surprisingly close to that of late nineteenth-century scientific medicine:

> The reader of the greater Hippocratic treatises will find, as Gomperz [Austrian philologist] has generously declared, the door opened upon a way which to us has become so familiar that we find it difficult to understand how in its own day Medicine revealed the growth of a method of thought and discovery then wholly new to the world – namely, the scientific method as contrasted with scientific ideas.[122]

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[118] Ibid., pp. 105-106.

[119] Historiographically speaking, Allbutt's use of Ionian thinking as a model of scientific culture should be regarded as a message from Allbutt, the historian, rather than 'a lesson from history'.

[120] I think Allbutt certainly assumed that Hippocrates existed as an individual but not all of the Hippocratic treatise were written by Hippocrates himself. In Chapter X of *Greek Medicine in Rome*, on Pneumatism, Allbutt wrote: "Now in this anonymous Menonian MS of London it would seem that Aristotle attributed a certain book of the heterogeneous Hippocratic collection – namely, the Π ερί φυσῶν – to Hippocrates himself; and it is evident that if we could fasten any one of these books upon Hippocrates we should have therein a clue to his personality, and to the authenticity of other books of the canon. Hitherto, as I have said before, we have assumed that certain works, marked by breadth of view, scientific temper, and sagacity, seemed by these very qualities to proclaim themselves as from the hand of the great master himself. And perhaps this is not altogether to reason in a circle, for such qualities, by the witness of his contemporaries, were his. But, unhappily, these are not the qualities which mark the treatise Π ερί φυσῶν, a title difficult to translate into English, but which may be rendered Concerning Airs." (Allbutt, *Greek Medicine in Rome*, p. 243.)

[121] Ibid., p. 54. It should be noted that Allbutt's account of Hippocratic medicine was just one of the various uses of Hippocrates to support certain viewpoints or to convey certain values. For the ways in which Hippocrates and his medicine have been used by various medical writers within particular historical, cultural and social circumstances, see David Cantor (ed), *Reinventing Hippocrates*, Aldershot, Ashgate, 2002.

[122] Allbutt, *Greek Medicine in Rome*, p. 79.

What was special about the Hippocratic method was that, first, the Hippocratic School based its medicine on careful observation and the use of inductive method:

> The great reform in thought which Hippocrates was perhaps the first to proclaim – viz. that general laws can only be established upon repeated and multiplied observation - was scarcely seen by his contemporaries and followers when it was lost in the dissolution of Greek national life.[123]

Second, Hippocratic medicine, in contrast with early Roman and Byzantine medicine, possessed freedom from superstition. Allbutt said this freedom was fully realized in the Hippocratic remark on epilepsy which was regarded by many as a supernatural, divine visitation:

> Indeed in my opinion these maladies, like all other things, are divine, and no one thing is more divine, or more human, than another, for all things are alike divine; yet each one of them has its own natural properties and cannot come into existence without natural causes.[124]

Although Hippocrates, according to Allbutt, said that epilepsy was divine, he regarded it as a physical problem indeed for he "denied that a particular disease was 'divine' save in the sense that all things are divine".[125] Allbutt first mentioned such a Hippocratic view of epilepsy in the chapter, 'Early Roman medicine'. The remark was mentioned again in the chapter, 'Byzantine medicine: The Finlayson Memorial Lecture' in which Allbutt discussed demonism in Byzantine medicine. The repeated appearance of the remark indicated that Allbutt wanted to emphasize the intellectual

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[123] Clifford Allbutt, 'Essay on the Medicine of the Greeks', *British and Foreign Medico-Chirurgical Review*, 1866, xxxvii: 185.
[124] Allbutt, *Greek Medicine in Rome*, p. 80.
[125] Ibid., pp. 114-115.

advances of Hippocratic medicine. For Byzantine medicine was chronologically much later than Hippocratic medicine.[126]

Allbutt also spoke highly of the theory of qualities (heat, cold, moisture, dryness) and the concept of health as balance of humours, which was adopted in Hippocratic medicine.[127] Allbutt stressed that they were rational. In a discussion of Alcmaeon of Croton, a younger contemporary of Pythagoras, Allbutt remarked:

> Disease Alcmaeon regarded broadly as a disturbance of the balance of bodily qualities; and in respect of the special senses as concussions or shifts of the conducting lines. Health was "isonomy" or equilibrium of the bodily parts and qualities. He rationalized, as did the Hippocratic school after him, the causes of diseases, attributing them to external agencies–plethora, inanition, fatigue; or again to dyscrases of the elemental qualities – heat, cold, moisture, dryness; health being a true blend of opposites. This doctrine of the School of Croton was thence carried forward, in medical tradition, to be developed by the great Hippocratic school. In Alcmaeon the four qualities were regarded rather as external causes of disease. How admirable are these views; admirable in truth of insight, and in emancipation from fantasy and convention![128]

[126] For Allbutt's first mentioning of the Hippocrates' denial of the supernatural character of epilepsy, see the chapter, 'Origins of Greek Physiology – Ionian and Italo-Sicilian', *Greek Medicine in Rome*, p. 80. For the second appearance of the denial, see the chapter 'Byzantine Medicine: The Finlayson Memorial Lecture', p. 400.

[127] It should be noted that the theory of qualities and the concept of health as balance had a longer history than Hippocratic medicine. They were adopted, but not invented, by Hippocratic writers.

[128] Allbutt, *Greek Medicine in Rome*, p. 54.

[128] Ibid., p. 100.

The idea of balance was also a key idea in Allbutt's physiological concept of health and disease. His praise for the Hippocratic idea of disease reinforced his advocacy of the modern physiological concept of disease.

Methodologically speaking, Allbutt argued that Hippocratic medicine possessed the essence of science: theorization and practice. This can be seen when Allbutt contrasted Hippocratic medicine with other medical sects. Like Samuel Gee, the author of 'Sects in Medicine' (as discussed in chapter two), Allbutt also compared various ancient medical sects. When he contrasted Empiricism and Scepticism, he noted the following:

> Empiricism has, notwithstanding, been a valuable discipline, a more valuable discipline than scepticism, because it bases itself on action, while the sceptic almost inevitably draws aloof from action.[129]

The Empiric focused only on action (practice) but ignored theorization. The sceptic avoided both. Allbutt, however, held that both theorization and practice were necessary for science. For Allbutt, fact gathering was not science. Theories must be constructed to explain facts. This view is common in all of Allbutt's medical and historical writings. For instance, in 'Words and Things', he wrote:

> An apple falls from a tree, everybody's fact; it was Newton's large imagination that saw in it a symbol of universal gravitation. Darwin may have collected no greater pile of facts than some other naturalists; at first, indeed, specialists for the most part fought against him; but Darwin saw the facts common to him and to them in the light of a vast imagination...Bundles or files of facts are not science until the man with the formative, let me say the creative, insight comes along, who by

[129] Ibid., p. 167.

> the fusion of intellect and imagination seizes upon the significant facts, those which give him the lines on which to build up aggregates of materials into a conceptual edifice.[130]

Whereas in 'Sects in Medicine' Gee proclaimed that he preferred the Empiric sect, Allbutt provided a detailed criticism of the Empirics in *Greek Medicine in Rome*. Given Allbutt's complaint about the empiricist and routine character of English medicine in his time (as discussed in chapter one), this particular criticism, I think, can be seen as a criticism of his empiricist contemporaries like Gee.

Allbutt maintained that the Empiric's aloofness towards hypotheses meant that medical practice lacked a theoretical anchor and became limited:

> Still in his mistrust of tentative hypothesis the empiric remained an extreme Baconian; he believed in induction, but did not apprehend the inductive method in its completeness; he tried to restrict himself as narrowly as possible to proximate causes, and to regard longer concatenations and remoter causes with more than suspicion. The chief fault of the empiric was that he was unaware of the fallacy of *enumeratio simplex*; he had no criterions [sic]; even in treatment he would be guided only by the uppermost signs.[131]

The Empirics held that they could base their practice purely on case records. Allbutt criticized them for not seeing the workings of the human mind. According to Allbutt, the human mind tended to construct hypotheses. It would not be satisfied if it could not explain events:

> The empiric did not see that the human mind cannot, or will not, content itself with perpetual suspense, but must construct

[130] Allbutt, 'Words and Things', pp. 1123-1124.

> [explanations]; or that in default of some chain of reason it will betake itself to analogies, which are usually superficial and false.[132]

In 'Sects in Medicine', Gee contrasted Scepticism and Dogmatism and claimed that Empiricism was the balance between the two extremes. However, Allbutt looked at the sects in a different way. For Allbutt, the Empiric sect represented one extreme and the Dogmatic sects such as Methodism represented the other. The Empiric only looked at particular facts and refused to form any general principles, whereas the Methodist was too eager to form general principles and ignored the discrepancies among particular facts:

> It is curious that each in his own extreme, the Empiric and the Methodist alike, the Empiric glued to the particular, and the Methodist blown into the universal, dispensed with the need of inquiry into causes, or indeed into processes. While for the Methodist the specific fact was as soon as possible to be sublimed into one of his three universals, for the Empiric it was an ultimate; the one refused to see it, the other refused to link it up.[133]

Yet, Hippocratic medicine, Allbutt argued, stood between these two extremes. The Hippocratic method emphasized that "cure depends upon attention to symptoms both general and particular".[134] Hippocratic medicine had general principles. But it also emphasized the unique properties of the particular, which might not be covered by the general principles. Thus, Allbutt claimed that the followers of Hippocratic medicine avoided the problems suffered by the Empiric and the Methodist.

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[131] Allbutt, *Greek Medicine in Rome*, pp. 167-168.
[132] Ibid., p. 170.
[133] Ibid., p. 197.
[134] Ibid., p. 198.

If the Dogmatist knew only how to speculate and the Empiric how to act, Hippocratic medicine was a balance between them. "In the school of Hippocrates it is true that the humoral hypothesis was professed; yet in the matter of practice the bent of it was strongly empirical", [135] Allbutt said. For although Hippocrates employed general principles, he also carefully observed the patient and would not let those principles blind him. Note that Allbutt used the modern scientific term 'hypothesis' (as discussed in chapter two) to describe the humoral theory. This rhetorical move made Hippocratic medicine look like an exact modern science.

In Allbutt's writings, Hippocrates was established as a supreme authority. Moreover, Allbutt built up many similarities between Hippocratic and physiological medicine. All this implied that the advocacy of physiological medicine was like a re-birth of Hippocratic medicine, a Renaissance in medicine, which was a good thing and should be celebrated. In this way, Allbutt tried to convince English speaking physicians of the superiority of the experimental and physiological approach to medicine. Since the Hippocratic and the physiological concepts of disease were based on the idea of balance, this parallel made the latter concept more acceptable. In short, Allbutt's historical writing was not neutral. It was one of his argumentative tools.

6 Conclusion

In this chapter, I have argued that Allbutt advocated the physiological concept of disease in late-nineteenth century English medicine as a reaction against the morbid entity view which he regarded as the result of a misuse of figurative language. My

[135] Ibid., p. 171.

discussion also indicates that when Allbutt promoted the physiological view he introduced German medical theories into English medicine.

Allbutt's support of the physiological view should not be isolated from his advocacy of other components of physiological medicine, such as the uses of instruments and experiments. In Allbutt's view, theories made with precise language allowed verification by means of experiments or clinical observation with the use of instruments. Without precise medical language, the potential of experimentation and instrumentation would not be fully realized. Hence, medical language, instrumentation and experimentation were interdependent in the cognitive structure of physiological medicine.

Last, it is interesting to see Allbutt's use of history to justify his medical views and the different ways in which Allbutt and Gee sought endorsement from ancient medical sects. It seems that, for nineteenth-century medical scholars like Allbutt and Gee, the past was a very important source of justification of their viewpoints and medical history a powerful argumentative tool.

Chapter Five

Making Medicine a Biological Science through Comparative Pathology

> "He [Comte] has already pointed out the three capital arts of exploration, viz., Observation, Experiment, and *Comparison*; and he proceeds to show at great length how these three arts are employed in *Biology*". (my italics)
> George Henry Lewes[1]

1 Introduction

Existing literature on comparative pathology, such as Lise Wilkinson and Michael Worboys' accounts, often relate this discipline to bacteriology.[2] Although the investigation of zoonoses is portrayed as the most useful aspect of comparative pathology, the idea of this branch of medicine and its possible approaches towards the study of disease, as I argue in this chapter with reference to Allbutt and others' work, is more than this. In 1888, Allbutt delivered an address, 'On the Classification of Diseases by Means of Comparative Nosology', in which his main argument for the importance of comparative pathology was made. He regarded this address as his most important one on the subject, and in his later speeches, he always referred his audience to this early work. In the address, Allbutt appreciated the growth of a number of nineteenth-century natural and biological sciences in association with the idea of evolution and made use of them to justify comparative pathology. With an emphasis on the notion of evolution in pathology, the address was also an important claim for the making of medicine as a biological science.

[1] George Henry Lewes, *Comte's Philosophy of the Sciences: Being an Exposition of the Principles of the Cours de Philosophie Positive of Auguste Comte*, London, Bell and Daldy, 1871, p. 174.
[2] See Lise Wilkinson, *Animals and Disease: An Introduction to the History of Comparative Medicine*, Cambridge, Cambridge University Press, 1992; Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865-1900*, Cambridge, Cambridge University Press, 2000. (It should be noted that in his account, Worboys aimed to examine germ theories and their uses in medical practice in late nineteenth-century Britain. Comparative pathology is only a part of his discussion.)

Generally speaking, comparative pathology is a study in which the pathologist identifies the common or different morbid phenomena in different kinds of organisms; and tries to discover their common or specific aetiology, determining factors, and properties of diseases. There are two lines of comparative research. The first one is to compare diseases of different human races, in different places, or of different generations. Through this kind of study, the pathologist endeavours to find out how cultural difference, food, climate, environment and heredity influence the occurrence of certain diseases. Another line of research is to compare diseases in humans, animals and plants. Comparison of this kind taken by comparative pathologists might reveal how and why the same kind of disease had different effects in different kinds of organisms.

With the use of the comparative method and animal experimentation, the pathologist could investigate disease mechanisms in different kinds of animals. This, as expected in Allbutt's time, might eventually lead to a more comprehensive understanding of disease and the discovery of a new aetiology which was superior to the one based on signs and pathological structures. With the advent of comparative pathology, the study of disease is no longer restricted to human morbid phenomena. It also covers lower animals and even plants.

In section two, I argue that Allbutt's advocacy of comparative pathology was a reaction to the anthropocentric character of nineteenth-century English medicine, as he perceived it. I also argue that in portraying the biological character of comparative pathology Allbutt drew upon August Comte's view of biological science. In section three, I argue that Allbutt endorsed comparative pathology with the idea of evolution and its incorporation of various nineteenth-century sciences, including neurology, embryology and bacteriology. Section four is a discussion of comparative-pathological research. I argue that there were pathological facts which were exclusively demonstrated by comparative studies. Last, I examine *The Journal of Comparative Pathology and Therapeutics* and *The Journal of Pathology and Bacteriology*, which were important forums for comparative pathology. I also discuss the Section of Comparative Medicine of the Royal Society of Medicine.

2 Allbutt's argument for the importance of comparative pathology and the transformation of medicine into a biological science

In the second half of the nineteenth century, there was an increasing interest in comparative pathology. In an anonymous article, 'Comparative Pathology–General Remarks upon Its Importance: with Reference More Especially to Disorders of the Nervous System in Animals', published in *The British Medical Journal* in 1869, the author remarked:

> It will be readily granted that pathology should not be limited to the study and classification of the abnormal changes which occur in the human body...it needs no argumentation to shew that the doings of disease in any one department of the animal kingdom must have important bearings on the diseases of Man...A pathological process in a highly developed animal may have its apparent obscurity lessened, if we study it as it occurs in an animal of comparatively simple organisation.[3]

The author was urging for a wider scope for pathological studies covering both human and lower animals and claiming that animal pathology would shed light on the human one. The author pointed out the potential value of the research done by the

[3] Anonymous, 'Comparative Pathology – General Remarks upon Its Importance: with Reference More Especially to Disorders of the Nervous System in Animals', *The British Medical Journal*, 1869, ii: 371.

veterinarian. For instance, the author said that veterinarians had shown similarities between chorea in dogs and in humans; and had suggested that hemiplegia (a form of paralysis caused by an injury at the corpus striatum) in humans was comparable to 'turnside' in animals, a sign of which was when an animal attempted to walk it began to turn round. "With his [the veterinarian's] help", the author said, "we shall obtain a broader basis for the induction of pathological laws; and he will gain also, for his profession, a nearer interest in things which concern humanity at large".[4] All this culminated in the message that the veterinarian and the physician should co-operate and the comparative method in pathology should be taken seriously.

In another article, 'The Importance of the Study of Comparative Pathology', published in the journal *Public Health* in 1888, Henry E. Armstrong expressed the view that animal pathology and human public health were closely related:

> In health or in sickness, man is closely allied to all other living creatures. Like himself, they are, in these respects, under the influence of soil, local surroundings, weather, season, food, water air, light, race, constitution, age, sex. Their diseases have a general resemblance to his own and are often transmissible to and from him. Hygienically and pathologically there is a close relationship between ourselves and different members of the animal and vegetable kingdoms.[5]

Armstrong discussed in detail how various diseases such as tuberculosis, foot and mouth disease, scarlet fever and trichinosis could be transmitted from animals to humans through contact, eating and drinking contaminated meat and milk. He also pointed out the problem that "physicians and veterinarians are too apt to work in different, and not always converging lines – sometimes apparently almost in

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[4] Ibid.

[5] Henry E. Armstrong, 'The Importance of the Study of Comparative Pathology', *Public Health*, 1888-1889, i: 164.

antagonism".[6] According to him, this was due to imperfect training of students in each profession. Comparative pathology, he said, was not taught in the medical curriculum. In veterinary medicine, it was taught "only from the animal point of view, and not in any sense with the health of man as an ultimate aim".[7] Armstrong proposed that a systematic teaching of the subject in both medical and veterinary curriculum should be established so that animal pathology could eventually benefit human medicine.

These two articles indicated a recognition of the relationship between animal and human diseases and the importance of comparative studies of both pathologies. Both authors argued from non-theoretical grounds; they both started with local evidence–cases in animal or human pathology. Such a form of argumentation was also common in other journal articles advocating comparative pathology in the late nineteenth century. In contrast with this line of argument, Allbutt's argument for the importance of comparative pathology was radically different.

Allbutt's concern in 'On the Classification of Diseases' was nosological. In the address, Allbutt pointed out that in an earlier paper, 'Classification of Disease' written in 1869, he had criticized nineteenth-century English nosology, which, according to him, took natural history as a model and categorized diseases in terms of signs and symptoms. Allbutt called such a method 'the Linnean method' and criticized it for being a narrow approach to the understanding of disease. The Linnean method, based on "properties selected only for their obviousness",[8] was constructed for practical purposes: diagnosis and therapeutics. Knowledge of disease was regarded as a means to achieve these purposes. Disease types classified by the

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[6] Ibid., p. 167.
[7] Ibid.
[8] Clifford Allbutt, 'On the Classification of Diseases by Means of Comparative Nosology", *The British Medical Journal*, 1888, ii: 285.

Linnean method had "no value beyond themselves" and did not help the practitioners "to perceive distinctions of kind".[9] It did not aim to make medical practitioners understand what Allbutt called 'the affinity' of disease, i.e. the kinship of diseases in terms of their evolutionary characters. Allbutt argued that the Linnean method should be replaced by the comparative method:

> I earnestly call, therefore, for your help to indicate the lines of a natural classification of disease by affinity which shall supersede our present Linnean method of classification by clinical features. We shall thus reveal the laws on which diseases have developed themselves from the simplest deviations in the simplest forms of life on the globe up to the complex and heterogeneous maladies which are seen in ourselves.[10]

In contrast to the Linnean method, Allbutt noted:

> When we classify a disease scientifically, we do so, not to group together affections having a community of site of aspect, not for easy reference or practical need, but to express the greatest possible number of facts concerning its relations with other diseases...That life consists of a series of processes which together constitute varieties or modes of growth, that is, health, scrofula, syphilis, rheumatism, gout, rickets, tuberculosis, etc...That diseases, taken severally, are often members of such series, which series may be constructed by a survey, not only of the individual, but of his collateral kin and of his ancestry, and also of other orders of the animal and vegetable worlds, a survey which cannot

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[9] Ibid.
[10] Ibid., p. 286.

be made until comparative nosology becomes a recognized branch of science.[11]

According to Allbutt, the comparative method was made up of four components: (1) The hereditary method – to trace the heredity of morbid functions in family trees, the embryo and even various kinds of cells, such as the red blood cell and the leucocytes; (2) The historical method – to study how evolutionary changes of function become changes of structure in generations; and how natural and artificial selections affected the susceptibility to diseases. This could be done by examining (i) how organisms of inferior vitality died out in the struggle for existence; (ii) the effectiveness of social policies (in the case of humans), such as sanitary means and prevention of marriage in diseased stocks, in eliminating morbid tendencies; (iii) comparing disease histories in different races.[12] (3) The geographical method – to explore phenomena of morbid variation in terms of the qualities of soil, aspect, seasons, atmosphere, and food products. (4) The experimental method – to study aetiology by means of experiment.

As discussed in chapter one, Allbutt held that English physicians, particularly the elite ones in London, were too practical and utilitarian. They regarded nosologies as simply heuristic devices – methods for classifying and identifying diseases for diagnostic and therapeutic purposes. Allbutt, on the other hand, saw investigations of disease as a part of biological whole. For him, disease, like other processes in nature such as growth and metamorphosis, was a biological object. Pathology, therefore, was a branch of biological study.

The biological view of disease was associated by Allbutt with his conception of medicine generally. Allbutt frequently criticized English medicine for being anthropocentric:

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[11] Ibid.
[12] Ibid., p. 288.

> To this moment comparative nosology is a term hardly heard, and although Sir James Paget, Mr. Bland-Sutton, and others have dealt with the matter, and although the laborious investigations into minute life have lately taught us much of its simplest modes, yet we have made no real effort, as a profession, to cast off our anthropocentric point of view. From veterinary science we are now drawing new and valuable knowledge, and shall draw more and more benefit from it; but its professors, able as some of them are, only differ from us in standing at a hippocentric instead of an anthropocentric point of view.[13]

The same criticism was voiced by Allbutt throughout his career. In 'The New Birth of Medicine' delivered in 1919, Allbutt complained again that "in Medicine we are still in the Ptolemaic stages of ideas; we are still anthropocentric".[14] Although Allbutt did not explain the source of this anthropocentric character in medicine, it seems that it came from Christian culture in which man is regarded as the master of the animal kingdom.[15] In nineteenth-century English medicine this character manifested itself in

[13] Ibid., p. 285.

[14] Clifford Allbutt, 'The New Birth of Medicine', *The British Medical Journal*, 1919, i: 437.

[15] In his paper 'Man, Animals and Medicine at the Time of the Founding of the Royal Veterinary College', Roy Porter held that Christian culture was the foundation of an anthropocentric world-view. According to Porter, in Tudor and Stuart Christian cultures, man was regarded as superior to other creatures. Man was endowed with an immortal soul, conscience and the power of reason. Although the relationship between man and animals was intimate, the role of animals was to serve man. No matter whether man was nice or cruel to animals, his behaviour was regarded as natural and justified. Such an anthropocentric character continued after industrial revolution and urbanization. The rise of modernization, according to Porter, created a bourgeois ideology which had a two-sided attitude towards animals. Some of the bourgeoisie, i.e. natural philosophers and medical men, did natural history, performed animal experiments and vivisection. Such practice distanced animals from human beings: Animals were no longer intimate servants of human beings as in Tudor and Stuart times and became an object of investigation or part of nature for man to explore. Other bourgeoisie expressed their humanitarian attitude by caring for slaves, orphans, the handicapped and animals. Porter held that although modern English people possessed a paradoxical attitude toward animals, the anthropocentric world-view never faded. (In the nineteenth century some medical men used animal experiments. This was also a manifestation of the anthropocentric character of medicine. For the experimental studies could simply be regarded as shedding light on human pathology rather than building up a wider theory of disease which covered both human and bovine maladies. However, such a culture certainly lay down the foundation of experimental biology in the nineteenth century.) (For more details, see Roy Porter, 'Man, Animals and Medicine at the Time of the Founding of the Royal Veterinary College',

the concentration on pathological anatomy and physical examination, which led the physician to focus on signs and lesions of the human body, at the same time neglecting diseases in lower animals and their relation to human diseases.[16]

Having criticized anthropocentric medicine, Allbutt proposed the idea that medicine could be made a biological science by the use of biological characterizations of pathology and diseases. For instance, in 'On the Classification of Diseases', after claiming that the scope of nosological studies should always be enlarged and revised, Allbutt remarked:

> As Dr. [Thomas] Laycock observed, "When men complain that medicine has no principles, they forget that their complaint extends beyond medicine". They must extend their complaint not only to nosology but to biology, of which it forms an essential part. We must study the pathology of structure and function in the entire series of organisms, a study scarcely begun...[17]

History of the Healing Professions: Parallels between Veterinary and Medical History, A. R. Michell (ed.), Wallingford, Oxon, C. A. B. International, 1993, pp. 19-30.

[16] It has been argued that the concentration on pathological anatomy and physical examination in mid-and-late-nineteenth-century English medicine was influenced by Paris medicine. (See Knud Faber, *Nosography: The Evolution of Clinical Medicine in Modern Times*, New York, Paul B. Hoeber, 1978.) However, it should be noted that Othmar Keel has argued that nineteenth-century English pathology was shaped by John Hunter and his followers rather than Paris medicine. Keel held that Paris medicine was in fact influenced by the 'Hunterian tradition'. (For details, see Othmar Keel, 'Was Anatomical and Tissue Pathology a Product of the Paris Clinical School or Not?' in Caroline Hannaway and Ann la Berge (eds), *Constructing Paris Medicine*, Amsterdam, Rodopi, 1988, pp. 117-186.)

[17] Allbutt, 'On the Classification of Diseases', p. 286. It should be noted that Allbutt's reference to Laycock was no coincidence because Laycock was an admirer of German medicine. Laycock acquired his M. D. at Goettingen in 1839. Before that, he had studied medicine at University College London and had visited France and studied medicine and surgery under the famous clinician-pathologist, Pierre-Charles-Alexander Louis and the surgeons, M. Jacques Lisfranc and A. Alfred Velpeau during the period 1833 to 1836. After obtaining his M. D., he returned to England and became Lecturer in Clinical Medicine at the York Medical School in 1846 and in 1855 he was elected Professor of the Practice of Physic at Edinburgh. In 1851, Laycock translated and edited for the Sydenham Society a German work, *The Principles of Physiology*, written by an evolutionist, Franz J. A. Unger; and a Latin work, *A Dissertation on the Functions of the Nervous System* by Georgius Prochaska. (For more details of Laycock's life and work, see Frederick Ernest James, *The Life and Work of Thomas Laycock, 1812-1876*, London, University of London, 1995. Also see Joy Pitman, 'Thomas Laycock', *Proceedings of the Royal College of Physicians Edinburgh*, 1992, xxii (no. 3): 384-389.)

In his later writings, Allbutt's use of biological language to characterize diseases became a remarkable feature. For example, in the 'Introduction to *A System of Medicine*' (1896), he held that life was "in a loom of woof and web".[18] "The play of life", or "the physiological drama" was an interplay between the organism and the milieu. Diseases were failures of this harmonious interplay.[19] In 'The New Birth of Medicine' (1919), he claimed that diseases should not be contemplated as "injury or dilapidation but also as phases of biology"[20] Also, "the individual", he said, "is but a link in the chain, so the human chain is a strand in the web of all living things".[21] In 'The Universities in Medical Research and Practice' (1920), he held that diseases "are not 'entities', nor even recurrent phases of independent events, but partial aspects of a universal series".[22] Although the use of biological language in medical writing was fashionable in the late nineteenth and early twentieth century, Allbutt's use of it as a continuation of his criticism of the anthropocentric medicine was original.

It seems that in constructing his biological characterizations of disease Allbutt drew upon August Comte's view of biological science and the comparative method. In his *Cours de philosophie positive*, Comte discussed the nature and method of 'Positive Biology'. George Henry Lewes, the English popularizer of Comte's philosophy, elaborated Comte's concept of biology as follows:

> ...Life presupposes the constant correlation of two indispensable elements, an organism and a medium (understanding by medium the whole of the surrounding circumstances necessary to the existence of the

[18] Clifford Allbutt, 'Introduction', in Clifford Allbutt (ed), *A System of Medicine*, 1st ed., 8 vols, London, Macmillan and Co., Ltd, 1896, vol. 1, xxiv
[19] Ibid.
[20] Allbutt, 'The New Birth of Medicine', p. 438.
[21] Ibid., p. 437.
[22] Clifford Allbutt, 'The Universities in Medical Research and Practice', *The British Medical Journal*, 1920, ii: 6.

> organism). From the reciprocal action of these two elements result all the phenomena of life.[23]

Comte's concept of biology emphasized the interaction between the organism and its environment (the medium). Biology, according to Comte, was a study of how the structure and internal functions of the organism formed a harmony with the external milieu.[24] Allbutt's biological language, such as 'the play of life', 'the physiological drama' and disease as a 'failure of the harmonious interplay' bore a strong Comtean character.

Comte regarded biology as an ensemble of physiology and anatomy. The value of biology was not based on having a distinct scientific content, but on its synthetic nature:

> ...positive Biology is destined to connect, in every determinate case, the anatomical with the physiological point of view, the static with the dynamic condition.[25]

Such a synthetic view of biology was shared by Allbutt. In his writings, Allbutt seemed to claim that biology was a synthesis of various sciences, such as physiology, pathology, bacteriology and biochemistry. For instance, in 'The New Birth of Medicine', there was a section entitled 'Biology and Medicine'. In this section, Allbutt discussed the colloids and the cell (objects of biological studies); immunity and susceptibility (objects of physiological and bacteriological studies); hormones, enzymes, compensations and inhibitions (objects of biological and physiological studies); the phenomena of catalysis, Ambard's constant, which is the level of non-protein nitrogen in the blood, and the balance of hydrogen and hydroxyl ions in the

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[23] Lewes, *Comte's Philosophy of the Sciences*, p. 175.
[24] Joseph A. Caron, '"Biology" in the Life Sciences: A Historiographical Contribution', History of Science, 1988, xxvi: 234.
[25] Lewes, *Comte's Philosophy of the Sciences*, p. 173.

blood (objects of biochemical studies).[26] Indeed, Allbutt's synthetic view of biology was common in the nineteenth-century French and German biological discourse and among the early twentieth-century English biologists.

Comte's emphasis on the important role of the comparative method in biology seemed to explain why Allbutt regarded comparative pathology as a part of biology. Comte claimed that the method of biology consisted of observation, experiment and comparison and he valued comparison most.[27] "Comparison is, however, the great art of Biology, and Comte is right in devoting to it the great space he does", Lewes said.[28] Comte classified five types of comparison as follows:

> It is requisite, says Comte, to distinguish the diverse aspects in which biological comparison may be viewed. First, Comparison between the various parts of each organism; Second, Between the sexes; Third, Between the diverse phases presented in the ensemble of development; Fourth, Between the races or varieties of each species; Fifth, Between all the organisms of the hierarchy.[29]

Whereas the observational and experimental methods were shared by other sciences, Comte's detailed characterization of the comparative method seemed to make it a distinctive feature of biology. Equally, in Allbutt's view, it was not only the studies of humans, animals and plants which made comparative pathology acquire the biological character, but the comparative method was also crucial. In 'The Integration of Medicine', Allbutt said:

> Professor W. H. Welch, of Baltimore, has written to me in these words: "Your first thoughts will be those of comparison...to shed across lights

[26] Allbutt, 'The New Birth of Medicine', p. 436.
[27] Lewes, *Comte's Philosophy of the Sciences*, p. 174.
[28] Ibid., p. 178.
[29] Ibid.

> reciprocally from the pathology of one kind of living thing upon another, watching the variations of functions in various biological systems".[30]

All this suggests that in portraying the biological character of comparative pathology Allbutt drew upon Comte's ideas.

To conclude this section, Allbutt's advocacy of comparative pathology was subversive to the anthropocentric character of English medicine, as he conceived it. His account suggested that pathology was part of biology and diseases should be reconceptualized and studied in a new way. Such a view was far more radical than those I discussed at the beginning of the section.

3 The foundation of comparative pathology in Allbutt's account

In this section, I argue that Allbutt's approach towards the advocacy of comparative pathology was epistemological and theoretical, in contrast with the practical approach adopted by others. Allbutt's conception of comparative pathology, I argue, was founded upon the idea of evolution and various nineteenth-century sciences, such as neurology, embryology and bacteriology.

In 'On the Classification of Diseases', Allbutt opened his discussion with the following remark:

> As Professor Geikie tells us, the modern geologist has to see that Europe and Asia were not created, but grew; and now that the whole phenomena of life, animal and vegetal, are comprehended as one, and this one is proved to have developed from the simplest beginnings, its diseases will

[30] Clifford Allbutt, 'The Integration of Medicine', *The Proceedings of the Royal Society of Medicine*, 1923, Section of Medicine, p. 2.

appear as morbid varieties of growth, and its laws of dissolution will be discovered.[31]

This remark revealed three important points: (1) Allbutt was a supporter of evolution. He saw the Earth, its animals and plants, as they were in his time, as products of evolution. (2) The view that the whole phenomena of life were comprehended as one which evolved from the simplest beginning was an assumption of Ernst Haeckel's recapitulation doctrine. (3) 'Dissolution' was a crucial term in Allbutt's close associate, John Hughlings Jackson's evolutionary theory of nervous disease. Below, I centre my discussion on these points.

Allbutt's support of evolution was evidential in his neurological thinking. As is well-known, Herbert Spencer modelled the structure and development of the brain on the evolution of the earth.[32] Spencer's theory implied a continuity between human brains and animal brains and he strongly influenced Jackson. Based on Spencer's model, Jackson developed an evolutionary theory of nervous disease.[33] According to Jackson, evolution of the brain is "a passage from the most to the least organized centres", "from the most simple to the most complex" and "from the most automatic to the most voluntary".[34] In 'On the Classification of Disease', Allbutt applied Jackson's theory to the explanation of the neurotic character of modern people's nervous disorders:

[31] Allbutt, 'On the Classification of Diseases', p. 285.

[32] Spencer employed geological language and the idea of evolution in his neurological thinking. He held that there was a hierarchy in the nervous system. According to him, throughout the course of evolution, the organism developed new needs. New forms of the nervous system would develop to meet those needs. The new forms would superimpose themselves upon the older ones, just as new rock strata superimposed themselves upon older strata. Spencer used geological terms, such as 'strata' and 'superimposition', to describe the structure and the workings of the brain. The new strata, on the surface of the brain, were younger and superior. They were more precise and advanced than the older strata. Evolution of the brain did not abolish the old strata. They were just superseded by the new ones. (See Roger Smith, *Inhibition: History and Meaning in the Sciences of Mind and Brain*, London, Free Association Books, 1992, ch. 4.)

[33] For details of Jackson's theory, see John Hughlings Jackson, 'Evolution and Dissolution of the Nervous System', *Selected Writings of John Hughlings Jackson*, 2 vols, London, Hodder and Stoughton Limited, 1932, vol. 2, pp. 45-75.

[34] Ibid., p. 46.

> Nervous organization has, of late years, progressed at a vastly accelerated ratio by means of quickened speech and locomotion; a higher scheme and also a higher average of nervous structure being thus attained. It is a matter of common observation that many functions of mind, especially the social functions, are now firmly organized, which some centuries ago were instable or scarcely organized at all. All these higher and higher strata, being more and more instable, bring further degrees of mobility and of capacity for change into the nervous system of modern peoples, and give a more neurotic character to their disorders.[35]

While Jackson characterized nervous diseases as dissolutions, Allbutt used similar terms, 'retrocessions' and 'reversions', to characterize nervous diseases:

> We must study the pathology of structure and function in the entire series of organisms, a study scarcely begun; and in them recognize the *retrocessions* of structure and function from higher modes of life, not forgetting also the *reversions* of the higher mental faculties through the instincts and propensities of the brutes.[36] (my italics)

All this indicates that the idea of evolution was central in Allbutt's neurological thinking.

A dissolution or retrocession was a kind of degeneration. As Daniel Pick convincingly argues, although the idea of degeneration alongside with evolution had a long history, the increasing use of the former, not merely as a description of the lower class, but as "a self-reproducing force; not the effect but the cause of crime, destitution and disease" was a new phenomenon in the nineteenth century.[37] Medical

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[35] Allbutt, 'On the Classification of Diseases', p. 286.
[36] Ibid.
[37] Daniel Pick, *Faces of Degeneration: A European Disorder, 1848-1918*, Cambridge, Cambridge University Press, 1996. p. 21.

writers, politicians, social scientists and novelists created a scientific language of degeneration and employed it in their explanations of disease and social problems, and also in the promotion of eugenics.[38]

The evolutionary model of the brain established a continuity between the nervous system of humans and that of lower animals. The continuity formed the common grounds on which comparative studies were based.[39] In 'On the Classification of Disease', Allbutt used this continuity as a key to understanding of various biological phenomena:

> In man the nervous system has gained a development so enormously beyond that of the highest pithecoid forms, that the diseases of man are correspondingly heterogeneous. As we descend from pithecoid types to lower forms – to dogs and cats, for instance – we shall find their diseases

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[38] According to Pick, nineteenth-century medical writers used degeneration to explain diseases. Topics centred on degeneration such as 'Gelatiniform Degeneration of the Right Half of the Stomach', 'The Nature of the Waxy, Lardaceous or 'Amyloid' Degeneration' and 'Degeneration of Race' had been common in *The Lancet* since the 1850s. (Ibid., pp. 190-191.) Darwin was certainly aware of the issue. Although Darwin claimed in *The Origin of Species* that "natural selection works solely by and for the good of each being, all corporeal and mental developments will tend to progress towards perfection", in *The Descent of Man and Selection in Relation to Sex*, he changed his tone and said that "natural selection acts only in a tentative manner" and "we must remember that progress is no invariable rule". (Charles Darwin, *The Origin of Species*, Cambridge, Mass., 1964. p. 489; *idem*, *The Descent of Man and Selection in Relation to Sex*, 2 vols, London, John Murray, 1875, vol. 1, p. 178. Cited in Pick, *Faces of Degeneration*, p. 193.)

Francis Galton, Darwin's half cousin, saw social degeneration as a serious problem and he regarded eugenics as the solution. In 1904, he founded at University College London the Eugenics Record Office, which later became the Galton Laboratory. (Ibid., p. 199.) Partly due to Galton's enthusiasm, the first International Congress of Eugenics took place at University College London.

In the nineteenth century, degeneration was also made a controversial topic in politics, social science and literature. French novelists such as Philippe Buchez and Emile Zola; English writers such as Charles Goring and Thomas Hardy; and an Italian criminologist, Cesare Lombroso, were keen on using degeneration to discuss various kinds of phenomena, including personal, familial and social ones. (Ibid., pp. 1-33.) Politicians associated degeneration with racism, mass-democracy and socialism. In late Victorian and Edwardian England, degeneration strongly concerned Londoners because London was seen as the bed of urban degeneration.

[39] It should be noted that comparisons are possible only if there are common grounds between the compared objects. The stronger the common grounds between the objects are, the more reliable the comparisons become. Allbutt's justification of comparative pathology was distinct because he emphasized that the idea of evolution was the common ground between different organisms, on which comparative studies of diseases were based. He showed why comparative studies of diseases were possible and legitimate. This point was usually neglected in other arguments for comparative pathology. It seems to me that other authors simply assumed that diseases in humans and animals could be compared, without showing why.

> to be simpler and more localised. Everyone who has had dealings with animals knows how long they may live, and even recover with great local lesions, even of organs we shall call vital. If we descend further we shall find local autonomy becoming still more evident, until in many reptiles we observe a reproduction of amputated limbs, and in still lower organisms a reproduction of their wholes from aliquot parts.[40]

This view, according to Allbutt, had a bearing on pathology. It explained why fevers manifested themselves differently in adults and children and why some lower animals did not have fever at all.

> ...a systemic thermotaxy can come only with a certain extension and integration of the nervous system, so that thermotaxy, or fever, is a nervous phenomenon, as recent observers have established. The earlier form of thermotaxy was, no doubt, an ebb and flow, of which a trace remains in the diurnal variations of normal human temperature, and which appears again in the reductions of disease, and is, as we should expect, more visible in the remittent form of the fevers of the child whose nervous system is less organised. So as we descend the scale of warm-blooded animals, and simplify the nervous system, we approach those organisms in which fever cannot be, and local lesions have no constitutional symptoms.[41]

It should be noted that the view that fever was a nervous phenomenon was nothing new in the nineteenth century. William Cullen (1710-1790) proposed a patho-physiology in which the nervous system was central and argued that all diseases

[40] Allbutt, 'On the Classification of Diseases', p. 286.
[41] Ibid.

affected the functions of the nervous system.[42] According to him, fevers had three essential stages: debility, chill and heat. He added that the initial stage of cold shivering in fevers was due to "a debility of the nervous power, which consistently 'lays the foundation of all the other phenomena'".[43] Despite some differences in detail, the general idea of Cullen's patho-physiology was shared by his contemporaries, such as Robert Whytt, Alexander Monro *secundus*, John Gregory and others.[44]

Cullen's view of fever was sustained by others in the nineteenth century. For instance, in his 'Leçons sur la Chaleur Animale', delivered in 1872 and published in 1876, Claude Bernard claimed that his physiological experiments supported the view that fever was a nervous phenomenon.[45] In his biography of Bernard, Michael Foster translated Bernard's theory as follows:

> The phenomena of nutrition are of two kinds: the one kind is that of destruction, of splitting up, of material disorganisation or combustion; the other is of organisation or organic synthesis.[46]

To elaborate Bernard's view of the relation between nutrition and the nervous system, Foster continued:

> The latter phenomena [organisations or organic syntheses] are under the influence of frigorific nerves which belong more especially to the

[42] William F. Bynum, 'Cullen and the Study of Fevers in Britain, 1760-1820' in William F. Bynum and Vivian Nutton (eds) *Theories of Fever From Antiquity to the Enlightenment* (Medical History, Supplement No. 1), London, Wellcome Institute for the History of Medicine, 1981, p. 138.
[43] Ibid.
[44] Strictly speaking, Whytt was prior to Cullen in advocating the nervous-system-based patho-physiology in Edinburgh medicine. Whytt was appointed Professor of Medicine at the Edinburgh Medical School in 1747. Cullen joined the School eight years later. For the detailed differences between Whytt, Cullen, Monro and Gregory's theories, and the social significance of this patho-physiology, see Christopher Lawrence, 'The Nervous System and Society in the Scottish Enlightenment', in Barry Barnes and Steven Shapin (eds), *Natural Order: Historical Studies of Scientific Culture*, Beverly Hills/London, SAGE, 1979, pp. 19-40.
[45] Michael Foster, *Claude Bernard*, London, T. Fisher Unwin, 1899, pp. 127-128.
[46] Ibid., p. 127.

sympathetic system; the phenomena of combustion are more specially governed by the vaso-dilator or calorific nerves which belong more particularly to the cerebrospinal system.[47]

Fever, Bernard argued, was caused by the action of the calorific nerves. This implied that it was a matter of the cerebrospinal system. "Now fever is essentially an exaggeration of the action of the calorific nerves and not merely a paralysis of the vaso-constrictor nerves".[48] The significance of discussing this theory of fever in the present section is that nineteenth-century neurology in association with the idea of evolution was an important resource for comparative-pathological research and Allbutt demonstrated this to his English contemporaries.

Embryology was also part of the foundation for comparative pathology in Allbutt's account. Embryological thoughts permeated his argument. The view that "the whole phenomena of life, animal and vegetal, are comprehended as one" (refer to p. 205) was an important assumption in Ernst Haeckel's recapitulation doctrine. According to the doctrine, ontogeny (individual development) was the brief and rapid recapitulation of phylogeny (the evolutionary history of ancestors).[49] The doctrine, Haeckel argued, was confirmed by his observations of the embryological

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[47] Ibid., pp. 127-128.
[48] Ibid., p. 128.
[49] In 1866, Ernst Haeckel, a supporter of Darwinian evolution and epigenesis, published a controversial work, *General Morphology*, in which he argued for a common ancestor of all organisms called 'the Gastrea' and proposed the recapitulation doctrine. Haeckel was influenced by Friedrich Wilhelm von Schelling's philosophy. Schelling tried to explain how man could understand nature and grasp the essence of things. His proposal was that man's knowledge of essence in everything was necessary because mind and nature had the same origin. Based on this assumption, Schelling developed the view that there was a fundamental unity of all objects and processes. All objects and processes, according to him, underwent a ceaseless transformation. The philosophers' task, he claimed, was to find out the law of this transformation. He argued that the transformation was dialectical: "[C]ontrarities in nature set in shifting but opposed polar positions eternally compelled their resolution and thus dialectically moved forward the ever-developing course of nature". (Coleman, *Biology in the Nineteenth Century*, p. 49.) Influenced by Schelling, Haeckel added that all forms of life were fundamentally one and were transformed by the same developmental force (evolution). Based on this view, Haeckel argued that transformation of organisms should have striking similarity, if not actual identity. The recapitulation doctrine, in his view, was meant to sum up the theory that all forms of life experienced a similar evolutionary process. (Ibid., pp. 48-49.)

development in various animals. Although the doctrine was controversial, it was influential during the period from 1860 to 1880. Allen Thomas, President to the British Association of the Advancement of Science in 1877, delivered his Presidential Address, 'Embryology and Evolution', to elaborate the recapitulation doctrine and celebrate the union of embryology and evolution.[50]

Comparative studies of the embryo, Allbutt argued, were the key to the understanding of certain diseases. In 'On the Classification of Diseases', he remarked:

> ...I referred also to the embryological interpretations of disease, these being based either on arrested development, as in the facial type of the idiot, or in retrogressions such as leucocythaemia. For the comparison of embryonic periods in the same and in different animals may be a master-key even to the diatheses themselves, as may be suggested, for instance, in lithiasis, wherein the formation of uric acid, and in diabetes, wherein the formation of glucose, are the resumptions of states normal to inferior types.[51]

In short, in Allbutt's view, embryology opened up new areas for comparative studies of disease.

Bacteriology, which strongly relied on animal experiment, was also an important component of comparative pathology.[52] Louis Pasteur, said Allbutt in 'The

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[50] George Basalla, William Coleman and Robert H. Kargon (eds.), *Victorian Science: A self portrait from the Presidential Address to the British Association for the Advancement of Science*, Garden City (New York), Anchor Books, 1970, p. 200.

[51] Allbutt, 'On the Classification of Diseases', p. 285.

[52] For comparative-pathological research on zoonoses, see Wilkinson, *Animals and Disease*, ch. 7-11; and Worboys, *Spreading Germs*, ch. 2, 6 and 7. It should be noted that in his paper, 'Animal Models and Concepts of Human Disease', William F. Bynum discussed how human diseases could be demonstrated and studied in animal experimentation. To begin with, Bynum used a remarkable example given at the Seventh International Medical Congress in 1881. In the Congress, David Ferrier, English physiologist and neurologist, demonstrated what he said was the localization of cortical functions. He ablated the motor area of the left hemisphere of a monkey and produced a unilateral paralysis of its right arm and leg. Jean Martin Charcot was struck by the phenomenon produced and exclaimed "C'est un malade!". (See William F. Bynum, 'Animal Models and Concepts of Human

Integration of Medicine', "threw open vast fields of comparative pathology".[53] Bacteriologists made use of bacterial culture, experiments, inoculation of living organisms, injection of various materials, microscopic observation and chemical analysis in their research. Such a mode of investigation, Allbutt claimed, often generated interesting conclusions:

> Pasteur tells us again that Cochin China fowls resist chicken cholera, and that the field mouse resists the septicaemia so fatal to the house mouse; with this a "concomitant variation" has been shown by Koch, who finds that the normal blood of the latter forms crystals with difficulty, whereas that of the field mouse gives crystals readily...[54]

The term 'concomitant variation' refers to a situation where if an antecedent circumstance is observed to change proportionally with the occurrence of a phenomenon, the former is probably the cause of the latter.[55] In this remark, Allbutt wanted to make the point that bacteriologists had found that the resistance of mice to septicaemia depended on the readiness of crystal formation in their blood: the more

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Disease', *Journal of the History of Medicine*, 1990, 45: 398) According to Bynum, "Ferrier had produced in the laboratory a condition which could be commonly seen in any hospital ward or neurological clinic". (Ibid.) Moreover, in the late nineteenth century, the animal model became increasingly common in pathological investigations. A two-volume work on animal models of human diseases, which detailed two hundred and eighty separate models, was produced. (Ibid., p. 399) There was also a great deal of experimental works on induced diseases in animals. (Ibid.)

Bynum suggested four common experimental techniques in animal experiments: (1) inoculation, such as François Magendie's demonstration that "rabies could be experimentally transmitted to dogs through inoculation with the saliva of a human being suffering from rabies" (Ibid., p.406) and the "experimental inoculation of syphilis in monkeys by Elie Metchnikoff and Émilc Roux" (Ibid., p.407); (2) injection, such as Marshall Hall's experiments on the toxicology of chemical compounds (Ibid., p.409); (3) ablation, such as Charles Edouard Brown-Séquard's ablation experiments on the adrenals of rats and Moritz Schiff's on the thyroid glands (Ibid.); (4) controlled diet, such as Justus von Liebig's analysis of consumption and excretion (Ibid., p.411).

[53] Allbutt, 'The Integration of Medicine', p. 3.

[54] Allbutt, 'On the Classification of Diseases', p. 290.

[55] Allbutt's use of the idea of concomitant variation is remarkable. The idea has a long history. It had been included by David Hume in his analysis of causation in *A Treatise of Human Nature* and was later incorporated by John Stuart Mill into his method of causation, which included (1) the method of agreement, (2) the method of difference, (3) the mixed method (of agreement and difference) and (4) the method of concomitant variation. It was likely that Allbutt was familiar with Mill's work because Lewes was Mill's associate.

difficult the formation of crystals in the blood of mice, the lower their resistance to septicaemia.

Immunity was an important area in bacteriological research. Studies of immunity opened up new areas for comparative pathologists to investigate. For example, Allbutt held that in bacteriological research, negroes were found to be immune from yellow fever. However, they were "very susceptible to cholera and small-box, elephantiasis and tetanus", and were "liable to prolonged suppuration".[56] Explaining these characteristics was a mission for comparative pathologists, who, according to Allbutt, should approach the question not only by comparing racial constitutions and disease histories in different human races, but also by considering the difference in the qualities of soil, seasons, climates and food product etc.[57]

In discussing geographical influences upon morbid variations, Allbutt remarked, "[t]hat malarial fever in one district should be the enteric of another will interest Sir W. [William] Aitken".[58] It should be noted that such a change in the character of fever was often regarded in the late nineteenth century as an instance of infectious diseases changing types. As William F. Bynum has pointed out, in the late nineteenth century, examples of infectious diseases changing types were often explained in terms of the evolution of germs.[59] Aitken was one of the prominent English theorists

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[56] Allbutt, 'On the Classification of Diseases', p. 289.
[57] Ibid., p. 291.
[58] Ibid.
[59] According to Bynum, in the nineteenth century, germs were found to have two paradoxical properties: on the one hand, they were specific; on the other hand, they seemed to possess potential variability. Bynum gives two examples of the latter. First, it was recorded that fever was only endemic and sporadic in Edinburgh in the late eighteenth century. However, it was found to be epidemic in 1817. The epidemic character continued and during the 1830s it was even found that fever became asthenic. At the same time, bloodletting, the traditional treatment, no longer worked. Rather, tonics, stimulants and generous diets were regarded as the more suitable treatment. The changes in disease character caused a debate. Some medical men regarded it as a case of evolution of disease. Some argued that the newly identified characters had always existed, but simply had not been discovered. (William F. Bynum, 'The Evolution of Germs and the Evolution of Disease: Some British Debates, 1870-1900', *History and Philosophy of the Life Sciences*, 2002, xxiv (no. 1): 56-57.)

Another example of the variability of infectious disease was the outbreak of typhus fever in Liverpool in 1861. (Ibid., p. 56.) According to Bynum, in that year an Egyptian frigate from of evolution of germs. He was an army pathologist in the Crimean War and was particularly interested in 'diseases of warm climates'.[60] He held that the striking geographical, racial and clinical manifestations of zymotic diseases could be explained in terms of their evolution.[61] Although, in his account, Allbutt focused on the geographical difference of the occurrence of diseases rather than the details of the evolutionary theories of germs, his remark on Aitken indicated that the evolutionist model for explaining the variability of infectious diseases did not escape his notice.

Darwin's theory of evolution was prominent in late nineteenth-century England. In his account, Allbutt also referred to Darwin's research and ideas. For instance, when he discussed immunity, he noted that "Darwin tells us that white cocooned silkworms resist the disease which devastates the yellow".[62] The notions of struggle for existence and natural selection were also employed by Allbutt. For instance, Allbutt reminded his readers that, in comparing "human diseases as it is now with its history in the past", they should remember that "in ruder states of man, as among animals, morbid variations were continually eliminated in the struggle for existence".[63] The reason was that when animals with weaker vitality died out, their morbid proclivities also died out too. As a result, fewer morbid proclivities would remain:

Alexandria docked at Liverpool. Before the docking, many of the crew had suffered from diarrhoea and dysentery. Later, the pilot was found dead of haemorrhagic typhus. Moreover, after some of the crew had been to a public bath, three staff at the bath got typhus. What was shocking was that typhus broke out in Southern Hospital after it had admitted thirty-two of the crew who had serious diarrhoea and dysentery. The cases were finally regarded by the Liverpool Medical Officer of Heath as cases of the changing type of disease.

Bynum held that in the 1870s, the employment of Darwinian evolution to explain the 'plasticity' of disease became common. William Roberts, Hubert Airy, Kenneth Millican and William Aitken developed evolutionary models to explain such a phenomenon.

60 Ibid., p. 64.

61 Ibid.

62 Allbutt, 'On the Classification of Diseases', p. 290.

63 Ibid., p. 288.

> Not only were organisms of inferior vitality constantly abolished, and their seed with them, but even the more vigorous were for the most part cut off as they passed their prime, so that those inherent morbid proclivities, such as gout, whose period of development belongs to later life, had no opportunity of presenting themselves.[64]

In his discussion of the influence of civilization upon natural selection in humans, Allbutt remarked that natural selection was complicated and counteracted by the development of medicine, hygiene, sanitary means and prevention of marriage in diseased stocks, the last of which Allbutt termed 'artificial selection':[65]

> But when human societies attain a high degree of development we begin to see the converse of this order [elimination of those with weaker immunity and vitality]. In them arises a civil consciousness and with it the disposition and the power to react upon themselves, to interfere wisely or unwisely with their own growth and their own media, and thus to modify, not only the society at large, but necessarily also the individuals of which it is composed.[66]

The consequence, Allbutt continued, was that:

> Thus natural selection is modified by deliberate counterplots; bad strains are preserved, which in former times would have died out, and higher social qualities are developed at the cost of some retardation of physical improvement.[67]

The worry that civilization would preserve 'undesirable' human traits was common among degenerationists in the late nineteenth century. Allbutt's remark indicated that

[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] Ibid.

he was knowledgeable about this complicated issue and reflected upon Darwin's ideas.

To conclude this section, the incorporation of the idea of evolution with various sciences, such as neurology, embryology and bacteriology, was an intellectual current in the nineteenth century. Adopting a theoretical and non-utilitarian approach, Allbutt used this intellectual current to endorse comparative pathology. In his discussion, Allbutt focused on the constitutional aspects of disease in relation to evolution. This established a continuity between humans and lower animals, which served as common grounds for comparisons. Moreover, comparative pathology, as Allbutt characterized it, wiped away the anthropocentric character of medicine by shifting the focus of investigations of disease from human bodies to the chain of living things. This created an equally, in the biological sense, between human and animal diseases and injected a biological character into medicine.

4 Research on comparative pathology

While Allbutt spoke for comparative pathology in the late nineteenth century, some contemporary pathologists were endeavouring to research on the subject. Although the importance of comparative pathology had not been widely recognized by physicians of the time, articles on the subject repeatedly appeared in *The British Medical Journal* and *The Lancet*.[68] In the following, I discuss the research of four of Allbutt's associates: James Paget, John Bland-Sutton, German Sims Woodhead and Frederick Hobday. I choose them because (1) Allbutt spoke highly of Paget and

[68] For instance, George R. Murray's articles, 'Some Advances in General and Preventive Medicine Due to Comparative Pathology' and 'Note on the Comparative Pathology of Influenza' appeared in *The Lancet* in 1894 (Vol. 1, pp. 730-733.) and in 1919 (Vol. 1, p. 12.) respectively; John Bland Sutton's paper, 'Abstract of The Erasmus Wilson Lectures on the Value of Comparative Pathology to Philosophical Surgery' was published in *The British Medical Journal* in 1891 (Vol. 1, pp. 342-348; 396-399.)

Bland-Sutton's research.[69] A discussion of their work can help elaborate Allbutt's evolutionary approach towards comparative pathology. (2) Woodhead was an influential advocate of experimental pathology in England and his comparative study of tuberculosis was remarkable. (3) Hobday was a co-founder of the Section of Comparative medicine of the Royal Society of Medicine. His research indicated that veterinarians' concern in comparative pathology was not limited to zoonoses.

Below, I also argue that these contemporaries of Allbutt claimed that there were substantial pathological facts only demonstratable by comparative pathology. In their research, the biological concept of disease was prominent. The advocacy of comparative pathology and the identification of it as a branch of biology at the turn of the century, therefore, should not be understood simply as a rhetorical strategy to make medicine sound closer to biology, whose scientific status was recognized at the time.

James Paget was a surgeon of St. Bartholomew's Hospital.[70] He was also well-known for his studies of plant pathology. His famous paper on the subject, that

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[69] For instance, in "On the Classification of Diseases", Allbutt claimed that Paget and Bland-Sutton were pioneers of the subject (refer to p. 178). In 'The Integration of Medicine', Allbutt mentioned them again:

> We have the mind of James Paget with us; and that of Sir John Bland-Sutton, happily still in the body, with us also. By him I have felt that this chair ought to have been occupied; for, while I have been talking about comparative pathology, he has been working in the field; but he has been called to a higher place [Bland-Sutton was elected President of the Royal College of Surgeons in 1923, the same year in which Allbutt delivered 'The Integration of Medicine'], a distinction on which we all cordially congratulate him. (Allbutt, 'The Integration of Medicine', p. 1.)

[70] According to his biographer, Shirley Roberts, Paget began his medical career in 1830 with an apprenticeship to Charles Costerton, a St. Bartholomew's man practising in Yarmouth. (Shirley Roberts, *Sir James Paget: The Rise of Clinical Surgery*, London, Royal Society of Medicine Service Ltd, 1989, p. 21.) During the apprenticeship, Paget received surgical training. He was interested in botany. He wrote and published, with one of his brothers, his first book, *Natural History of Great Yarmouth*. (Ibid., p. 29.) In 1832, he attended surgical lectures, taught himself French and read Georges Cuvier and Marie-François-Xavier Bichat. (Ibid., p. 30.)

In 1834, he entered St. Bartholomew's Hospital. (Ibid., p. 35.) He worked hard on anatomy, taught himself German and read Johannes Müller. He studied in Paris for a short period, reading the works of leading French physicians such as Pierre-Charles-Alexander Louis. (Anonymous, 'Obituary of James Paget', *The British Medical Journal*, 1900, i: 51.) He was Sub-editor of *The Medical Gazette* from 1837 to 1842 and he reviewed foreign books for the Medico-Chirurgical Society. (Roberts, *Sir James Paget*, p. 68.) In 1839, he was appointed Demonstrator of Morbid Anatomy at St. Bartholomew's and

Allbutt often referred to, was his address, 'Elemental pathology' delivered in 1880. The address was a discussion of the nature of inflammation, of galls, and of other morbid growths in plants. It is interesting to note that, in the address, Paget used the term 'inflammation', a term of human pathology, to refer to morbid changes showing swellings in plants. Such a use built up a common ground for his comparison of morbid changes in plants and in humans. Paget classified these morbid changes in plants into 'inflammatory hypertrophies' and 'hyperplasiae'; that is swellings due to either inflammation or overgrowth.

Paget argued that inflammations in plants were preceded by irritation. He said, "all these morbid growths have their origin in what may justly be called 'irritation' of the part on which they grow" and they showed "signs of degeneracy from natural conditions".[71] These signs included, for instance, "absence of stomata or similar structures" or "the presence of the red, or yellow, or other colours commonly noticed in decay".[72]

Paget regarded galls as a kind of inflammation. Galls in plants, according to him, were usually formed by inoculation of morbid poison by insects. The swellings caused by poison, Paget claimed, could be "compared with local consequences of the insertion of vaccine lymph, or any such morbid poison, in ourselves or other

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in 1841 became Surgeon to the Finsbury Dispensary. (Ibid., p. 75.) During the demonstratorship, he was welcomed by students who requested the authorities to make him a lecturer. (Ibid., p. 77.)

In 1843, Paget was made Honorary Fellow of the Royal College of Surgeons. (Ibid., p. 81.) Three years later, he was appointed Assistant Surgeon to St. Bartholomew's Hospital and was elected Arris and Gale Professor of Human Anatomy and Surgery at the Royal College. (Ibid., p. 99.) In 1858, he was appointed Surgeon-Extraordinary to the Queen. (Ibid., p. 123.) In 1861, he was elected full Surgeon. In 1875, he became President of the Royal College of Surgeons. (Ibid., p. 154.) Two years later, he was made Representative of the College on the General Medical Council. He forcefully promoted the value of a pathological museum. In the same year, he delivered the Hunterian Oration before the Prince of Wales. (Ibid., p. 161.) Moreover, he was also President of the Clinical Society in 1869, of the Royal Medical and Chirurgical Society in 1875, and of the Pathological Society of London in 1887 respectively. (Anonymous, 'Obituary of James Paget', p. 51.)

[71] James Paget, 'Elementary Pathology', *The British Medical Journal*, 1880, ii: 649.

[72] Ibid.

animals".[73] (Paget emphasized that he only discussed local consequences and compared only the local characteristics of inflammation in plants and humans because plants did not have lymph or blood. Lacking these circulating fluids, plants usually did not have general infections and constitutional diseases in the same sense that humans did.)

Next, Paget compared galls and human specific diseases. According to him, plant pathologists had identified numerous kinds of morbid poison and found that each kind of poison would produce a specific kind of gall. This phenomenon, he said, was suggestive to human pathologists:

> We may safely believe that, for each of these morbid poisons, there is no test yet possible except that of the disease which it may produce; and so we may as safely believe that there may be many morbid poisons or morbid conditions of blood in ourselves which may be indicated by very different products of disease, though they may be beyond detection by any other, even the most refined, method of research.[74]

It should be noted that the idea of specificity was not new in 1880. It has a long history and was developed in relation to bacteria by Robert Koch and others in the late nineteenth century.[75] Hence, Paget's use of the idea was nothing new. His novel point, rather, was to draw a parallel on specificity in diseases between plants and humans; and to suggest that, with reference to plant diseases, human diseases could be far more specific than human pathologists expected.

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[73] Ibid.

[74] Ibid., p. 650.

[75] See Lester S. King, 'Dr Koch's Postulates', *Journal of the History of Medicine and the Allied Sciences*, 1952, vii: 350-361. Also see Margaret Pelling, 'Contagion/Germ Theory/Specificity', in W. F. Bynum and Roy Porter (eds), *Companion Encyclopaedia of the History of Medicine*, 2 vols, 1993, vol. 1, pp. 309-334.

Paget added that the galls caused by different kinds of morbid poison could have very different appearances. They could be "as unlike as are a pustule and a goître, or a vaccine vesicle and a carbuncle, or as any of the morbid changes due to gout or rheumatism".[76] In plants, the great differences were usually marked "in outer shape and construction much more than in minute structure".[77] The minute structure in all kinds of galls (however apparently different) was similar. This character, Paget claimed, was found in human pathology too. While the outer shape and the construction of inflammation in humans could be very different in pustules, vesicles and fibroid etc, there were always "general characters and degrees of likeness in all inflammatory products".[78]

Paget argued that the study of specific diseases in humans threw light on the study of galls. "[I]n the study of specific diseases in ourselves, we see many variations due to the differences in the parts, or even in the persons affected with them", Paget said, "in the study of galls, similar variations may be seen".[79] There were instances when an insect laid its eggs in different parts of the same plant, very different galls were produced. (Usually insects laid eggs in one part of one plant. Thus, such cases were not very usual.) Paget claimed that the differences were due to the different nature of each part of the plant. Although some German pathologists argued that when the same insect laid eggs in similar parts of different plants, the resulting galls appeared similar, Paget was skeptical about this view and argued that the galls should be, in some aspects, different due to "the distinctive characters of the plants on which they grow, just as, in ourselves, a specific disease may be modified by the personal

[76] Paget, 'Elemental Pathology', p. 650.
[77] Ibid.
[78] Ibid.
[79] Ibid.

conditons of each patient".[80] He further claimed that if the eggs were laid in different parts of different plants, the differences of the resulting galls would be more obvious.

Paget held that sometimes galls did not grow directly after an insect had laid its egg. There could be a long delay. To explain this, Paget said, "two or more conditions must concur to the production of some disease, and one of them must wait for the complete efficiency of the rest".[81] This was in fact the old notion of predisposing and exciting causes in human medicine. He continued:

> In the case of these long delayed galls, either the egg, after being laid, requires a long time for the completion of changes ending in the production of the necessary morbid poison, or the plant-structure in which it is laid requires the time for changes to make it susceptible of the poison; or both egg and plant may need to change. So, in us, two or more conditions must concur. A tendency to gout may be inherited, and the blood may have slowly acquired the necessary morbid condition; but no structure may be susceptible of gouty disease till a blow, or a strain, or some disturbance of nervous force makes it so. So with cancer; a general tendency may be inherited, but it must wait till the material of some structure is, by age, or injury, or long continued "irritation", changed into fitness for concurrence in morbid action with the material on which the general tendency depends. Then, when the two materials meet in mutual fitness, the result may be a change so great, that we may compare it with that from an act of impregnation.[82]

[80] Ibid.
[81] Ibid.
[82] Ibid., pp. 650-651.

The ideas of predisposing and exciting causes had been used by Galen, William Cullen, Herman Boerhaave and others.[83] This classification of causes was also widely discussed in late-eighteenth-and-early-nineteenth century English medical literature.[84] Therefore, Paget was using a traditional medical classificatory system of cause and applying it to the biological domain in general. He was not suggesting anything new about cause. This is, however, anthropocentric in a way that he did not, I suppose, intend to be. For he was applying to plants a longstanding causal classification in human medicine. He examined plant diseases with certain assumptions from human medicine and did not study plant diseases in their own right.

There were other morbid growths in plants which Paget regarded as comparable to human diseases. For example, he held that cankers on elms and apple-trees were like cancers in humans (In German, cankers are called 'Krebs' which means cancer in English:)[85]

> They [cankers] are usually rounded and coarsely nodular masses of wood covered with bark...Thus, in form, they are not far unlike masses of scirrhous cancer projecting from the breast or axillary glands; and the likeness is the nearer when, as is usual, the depression on their surface leads into a cavity bounded by decaying wood. The imitation of an ulcerating cancer may justify the use of the same name...[86]

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[83] Christopher Hamlin, 'Predisposing Causes and Public Health in Early Nineteenth-Century Medical Thought', *The Social History of Medicine*, 1992, v: 53, 69.
[84] Ibid., p. 53.
[85] Paget's source of reference for this view included Sorauer, *Handb. Der Pflanzenkrankheiten*, 1874, p.199; Göthe, *Ueber den Krebs der Apfelbäume*; Leipzig, 1877.
[86] Paget, 'Elemental Pathology', p. 651.

Other similarities included the likeness between exostoses, knours or wens in plants and tumours in humans. As Paget put it, the structures of exostoses in plants and bony exostoses in humans were highly comparable.[87]

A more remarkable character was the similar modes of growth between exostoses and bony exostoses. Paget held that if exostoses were cut into sections, pedicles appearing as cylinders of wood could be found "passing from their centres into continuity with the normal wood of the trunk".[88] Through the pedicles, the exostoses obtained the materials for growth. When detached, the exostoses could "wholly subsist and increase on materials derived from the cambium spread out over them".[89] Such means of continued growth, Paget remarked, "resemble the typical tumours of our pathology more than do any other morbid growths on plants; and they may continue to grow so long as nutritive material is supplied to them".[90]

It seemed to Paget that the history of the growth of exostoses should be suggestive for students of human pathology. The growth of exostoses in plants began with a lethargic state, followed by an active state, in which the exostoses continuously drew nutrients from the living parts around them. This growth process, Paget held, indirectly confirmed a particular theory of human tumours:

> Surely, they [the growths of the exostoses in plants] may thus confirm that theory of tumours which regards those whose structure does not differ widely from the natural structures as growths derived from portions of germinal substance remaining, though one knows not why, for years

[87] Ibid.
[88] Ibid.
[89] Ibid.
[90] Ibid.

"lethargic", and then becoming active, growing in their own method, and subsisting on materials derived from the living parts around them.[91]

All in all, I think that Paget's discussion was important because (1) he claimed it was important to show how diseases in plants and in humans could be compared; (2) he used his examination of the morbid structures and the mode of morbid growths in plants to suggest analogies with human pathology; and (3) by choosing plants, which possessed no nervous system, blood and lymph, and humans as the objects of his comparison, Paget could conclude how far the nervous system, blood and lymph played a part in human diseases. (If tumours in plants and animals grew in similar ways as in humans, then it could be inferred that the influence of the nervous system, blood and lymph was not significant.)

Apart from Paget, John Bland-Sutton was another practitioner of comparative pathology whom Allbutt often referred to.[92] Bland-Sutton was a surgeon at the Middlesex Hospital.[93] He was a Darwinian. After studying carefully Darwin's *Origin of Man*, Huxley's *Lessons in Elementary Physiology*, Daniel Oliver's *Lessons in Elementary Botany* and St. George Mivart's *Lessons in Elementary Anatomy* in his youth, he claimed that his "conversion" from the Creationist to the Darwinian world-view was complete.[94]

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[91] Ibid.

[92] For instance, Allbutt frequently quoted Bland-Sutton in the section, 'The Historical Method' in 'On the Classification of Diseases', pp. 288-290, particularly on p. 290.

[93] Bland-Sutton entered Middlesex Hospital Medical School in 1878. After graduating in 1880, he had been to Paris and Vienna to learn ophthalmic surgery. In 1881, he became Senior Demonstrator of Anatomy at the Middlesex Hospital. In 1884, he was appointed Lecturer on Comparative Anatomy. In the same year, he also became Fellow of the Royal College of Surgeons of England. He taught anatomy at the Middlesex Hospital Medical School for seventeen years altogether: being Lecturer and Superintendent for five years and Demonstrator for twelve years. In 1886, he was appointed Assistant Surgeon to the Middlesex Hospital. In 1902, he was appointed Surgeon. Eight years later, he was elected to the Council of the Royal College of Surgeons. During the First World War, he worked as a military surgeon. In 1923, he was elected President of the Royal College and was made Hunterian Orator. (See John Bland-Sutton, *The Story of a Surgeon*, London, Methuen & Co. Ltd, 1931.)

[94] Ibid., p. 22.

Bland-Sutton's knowledge of animal pathology came from his zoological study and practice of comparative anatomy at the Zoological Gardens and the Prosectorium at the Zoological Society. He was actively involved in and, said he, benefited from the activities held by the Society. For instance, in 1881, P. L. Sclater, Secretary of the Society, invited him to attend the scientific meetings of the Society, in which he was impressed by Joseph Lister's paper on the anatomy of the peculiar reproductive organs of the female kangaroo. He determined to follow this line of research in all kinds of vertebrates and specialized in the normal and morbid anatomy of the mammalian reproductive organs.[95]

At the Royal College of Surgeons, Bland-Sutton became associated with Paget. Bland-Sutton admired Paget, who encouraged him to pursue comparative pathology.[96] From 1886 to 1891, Bland-Sutton delivered eighteen lectures on 'Evolution and Disease' at the College and "Paget attended seventeen and apologized for the one he missed".[97] The lectures were later published as *Evolution and Disease*.[98]

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[95] Ibid., p. 66. Another example of Bland-Sutton's active involvement in the Zoological Society was that, in 1881, a large number of animals died in its menagerie and then Jonathan Hutchinson urged the Council of the Pathological Society of London to conduct a systematic post-mortem examination of the bodies to investigate the cause of death. Bland-Sutton was appointed to make the pathological examinations and this enabled him to obtain first-hand knowledge of the morbid anatomy of animals. (Ibid., p. 135.) The Zoological Society also provided Bland-Sutton with the opportunities to study the comparative anatomy of mammalian brains; (Ibid., p. 147.) to examine whether ligaments and fibrous structure could be used to testify Man's mammalian kinship and descent; (Ibid., p. 136.) and to listen to Huxley and Owen's presentations and debates. (Ibid., p. 144.) In short, the Zoo and the Prosectorium provided Bland-Sutton with ample materials for comparative-pathological studies.

[96] Ibid., p. 101.

[97] Ibid.

[98] *Evolution and Disease* contained a chapter on 'The Enlargement of Part from Increased Use, Overgrowth and Irritation'; a chapter on 'Disuse and Its Effects'; a chapter on 'Vestigial Parts' in animals; two chapters on 'Atavism'; a chapter on 'The Transformation of Malformations and Acquired Defects'; another on 'Anatomical Peculiarities of the Teeth in Relation to Injury and Disease'. The last three chapters were devoted to 'Causes of Disease – Inflammation and Fever', 'Tumours and Cancers', and 'The Zoological Distribution of Disease'. Its scope was wide. It shed light on understanding disease in an evolutionary perspective, with reference to animals other than human beings.

Evolution and Disease contained a number of discussions on morbid phenomena in humans and animals. For instance, in the chapter on 'The Enlargement of Part from Increased Use, Overgrowth and Irritation', Bland-Sutton argued that irritation might cause increased blood supply, which would result in overgrowth. To explain this, he referred to John Hunter's animal experiments. Hunter, according to Bland-Sutton, had demonstrated the relation between increased blood supply and overgrowth in animals. In one of his experiments, Hunter transferred the spurs of cocks to the vascular tissue of the comb.[99] The spurs took root there. Due to extra supply of blood and disuse, the spurs grew inordinately.

Bland-Sutton argued that this kind of increased blood supply might be due to nervous influence or lack of it.[100] He remarked that Heinrich Friedrich Bidder had excised a piece of the sympathetic nerve in the neck of a growing rabbit. The excision was followed by overgrowth of the ear of the same side.[101] The experiment had been repeated by others on growing rabbits and dogs. In the experiments on dogs, a piece of the vagus and sympathetic nerve was excised (due to the fact that in dogs both nerves are coated in the same sheath). "In all cases", Bland-Sutton remarked, "the ear on this side became distinctly longer, broader, and somewhat thicker than its fellow. The hair was longer and stronger on the side operated upon, and the ear remained distinctly warmer".[102]

Among various kinds of overgrowth, that of hair was common and interesting. One example was spina bifida occulta, the growth of a tuft of hair due to irritation of the spine.[103] This malformation could happen to humans and animals. "In this malformation," Bland-Sutton said, "the bony arches covering the spinal cord are

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[99] John Bland-Sutton, *Evolution and Disease*, London, Walter Scott, 1890, p. 21.
[100] Ibid., p. 22.
[101] Ibid., pp. 22-23.
[102] Ibid., p. 23.
[103] Ibid.

defective, and the nerves issuing from the cord at this spot are involved in fibrous tissue or compressed by an accumulation of fat."[104] As a result, a tuft of hair often many centimetres in length appeared on the skin covering the defective parts of the spine. [105] Bland-Sutton noted that Rudolf Virchow had demonstrated such an overgrowth in fowls. Virchow noticed that the heads of Polish fowls were surmounted by a luxuriant tuft of feathers.[106] He examined the fowls and found that underlying the feathery crowns there were defects in the roofs of the skull, resembling the condition known in man as meningocele.[107] Virchow also studied the effects of spina bifida in man. The study, Bland-Sutton remarked, "has led Virchow to regard the crown of feathers as the result of irritation, in the same way that the hairy tuft may be accounted for in the back of those with spina bifida occulta".[108]

This kind of research, Bland-Sutton said, shed light on the understanding of some rather puzzling malformations. It was found that abnormal growth of hairs occurred in the stomach of a darter (a kind of Snake-bird). The hairs formed a remarkable plug around the pyloric orifice of the stomach.[109] Bland-Sutton noted that Alfred Garrod (Consulting Physician to King's College Hospital and the College's Professor of materia medica and therapeutics), in his account of the anatomy of the darter's stomach, had suggested that the function of the hairs was to "act as an excellent sieve to prevent the entrance of solid particles, fish-bones etc., into the narrow

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[104] Ibid.
[105] Ibid.
[106] Ibid.
[107] Ibid.
[108] Bland-Sutton added that the fowls were "extremely uncertain in their gait, given to performing circular movements, and walking sideways if excited, as though they possessed an unstable nervous system". (Ibid.) Apart from the fowls examined by Virchow, Bland-Sutton also noted that Isidore Gerffroy Saint-Hilaire had described and figured the head of a duck which had an overgrowth of a tuft of feathers and a foot on the occiput. (Ibid., p. 25.) The cranium underlying the tuft was defective. During life the overgrown foot was of a beautiful orange-yellow colour, just like a normal one. Another case of overgrowth of a foot from the skull of a duck was noted by Friedrich Tiedemann in 1831. (Ibid., p. 26.)
[109] Ibid.

intestines".[110] To explain the formation of the hairs, Bland-Sutton suggested that "the contact of fish-bones and scales would act as irritants and induce a crop of hairs which, being advantageous to the bird, have been inherited".[111] "Even the complex intestinal mucous membrane may, under exceptional circumstances, become converted into pilose skin", Bland-Sutton added, "[s]uch abnormal skin is more likely to possess hair if it be irritated".[112]

Other interesting discussions in *Evolution and Disease* included those of leucocytes and tumours. In the discussion of the former, Bland-Sutton began with an examination of amoeba and remarked that complex animals should be understood as compound amoebae. "[T]he essential difference between the simple amoeba and the most complex animals", said Bland-Sutton, "is that the latter are compound amoeba in which individual cells perform separate duties".[113] Among various kinds of cells in humans, leucocytes possessed properties similar to those of amoebae. Behaving like amoebae, the leucocytes of an animal could digest and remove its useless parts and those 'foreign' objects inside its body. According to Bland-Sutton, the digesting power of leucocytes was so strong that no animal tissue was capable of resisting their attacks.[114] For instance, when the milk-teeth of children or puppies were shed, the crown was present but the root was usually absent. Later, the portion of the tooth in contact with the gum appeared irregular. Microscopic examinations showed that the portion was filled with numerous leucocytes. This suggested that the leucocytes had been digesting the root of the tooth to facilitate its fall. Similar phenomena were found in cases of the tadpole losing its tail and the stag losing its antlers. Apart from digestion of useless parts, Bland-Sutton also discussed how leucocytes fought

[110] Ibid.
[111] Ibid.
[112] Ibid.
[113] Ibid., p. 215.
[114] Ibid.

pathogenic bacteria; how inflammation and fever resulted and pus formed. He concluded:

> It certainly simplifies our notions of morbid processes to find that the phenomena known as repair of wounds, inflammation, and fever, are manifestations of the same process by which a child loses its milk-teeth, the tadpole its tail, or the stag its antlers, rather than to look upon such conditions as the result of some special law.[115]

In a chapter on tumours, Bland-Sutton noted that tumours were frequent in human beings, horses, cattle, sheep, and dogs but rare in wild animals. According to him, tumours could be classified into cysts, infective tumours (sarcomata and infective granulomata), neoplasms, and cancers.[116] In man, Bland-Sutton noted, cancer was more common than infective tumours. In domesticated mammals, cancer was unusual, whereas infective tumours were very common. In wild animals almost all cases of tumours were infective ones.[117] The causes of these distributions, Bland-Sutton said, should be investigated because they might reveal the nature of each kind of tumour and the peculiar structure favourable to the growth of particular tumours.

In summary, Bland-Sutton examined morbid and physiological phenomena with a biological perspective, with reference to various kinds of animals and simple organisms. His work showed how medicine could be closely tied to biology.

[115] Ibid., p. 227.
[116] Bland-Sutton characterized infective tumours as follows: "[t]umours belonging to this group are caused by micro-organisms". The tumours are "the most generalized of all tumours and occur in every kind of vertebrate". "Structurally, they consist of small round, or spindle-shaped cells, intermixed with giant-cells in variable proportions. Infective tumours are of two classes: (a) sarcomata, (b) infective granulomata. A sarcoma usually appears as a tumour, and later infects the system, producing secondary nodules in different organs, such as the lungs, liver etc". "The micro-organism or causative agent has not yet been isolated, and we have no satisfactory evidence that a sarcoma can be inoculated into another animal". "The infective granulomata", Bland-Sutton continued, "appear as small scattered nodules in various parts of the body. In many cases the micro-organism which produces the disease, has been satisfactorily isolated". One of the examples of such a tumour, Bland-Sutton claimed, was actinomycosis. (See ibid., pp. 233-237.)
[117] Ibid., p. 236.

Compared with Bland-Sutton's research, German Sims Woodhead's work on comparative pathology appeared more practical. For Woodhead dealt with infectious disease, and chiefly, the transmission of tuberculosis.

Bacteriology and the promotion of laboratory research in medicine were important components of Woodhead's scientific pursuits. In 1883, he published his first book, *Practical Pathology*, in which he applied bacteriology to the study of tuberculosis.[118] Two years later, his second book, *Practical Mycology*, was published.[119] Woodhead was the first Secretary of the Edinburgh Pathological Club, which was founded by John Batty Tuke with an aim to encourage experimental research at Edinburgh. In 1887, Tuke proposed that the Royal College of Physicians Edinburgh should establish a Research Laboratory. The proposal was passed and Woodhead was made the Superintendent of the Laboratory from 1887 to 1890.[120] In 1890, he was appointed Director of the Laboratories of the Conjoint Board at the Royal Colleges of Physicians (London) and Surgeons (England). He held this post until 1899, when he proceeded to the Professorship at Cambridge.

Tuberculosis was a central area of Woodhead's research. He was a researcher of the Tuberculosis Commissions of 1890 and 1894. He wrote several papers on the disease. They included 'On the Transmission of Tuberculosis from Animals to Man, by Means of Flesh and Milk Derived from Tuberculous Animals', which was published in 1892 jointly with John McFadyean, Principal of the Royal Veterinary College London from 1894 to 1926 and the founder of *The Journal of Comparative Pathology and Therapeutics*; 'An Address on the Channels of Infection in Tuberculosis' in 1894; 'The Bacteriology of Tuberculosis' and 'Tuberculosis in

[118] Ritchie, Boycott and Dean, *In Memoriam: Sir German Sims Woodhead*, p. 3.
[119] Ibid.
[120] For the history of Laboratory, see John Ritchie, *History of the Laboratory of the Royal College of Physicians of Edinburgh*, Edinburgh, Royal College of Physicians, 1953.

Cattle: its Relation to a Pure Meat and Milk Supply' in 1898; 'Tuberculosis and its Prevention' in 1898-99; 'The Incidence of Tuberculosis in Childhood' in 1914; and 'Tuberculosis and the Ministry of Health' in 1919 etc.[121] Almost from the 1890s to the 1920s, Woodhead continuously conducted research on the disease. One of his remarkable achievements was, as James Mackenzie pointed out, his recognition that the first sign of tuberculosis was a rise of temperature and his demonstration of the temperature curves caused by the disease.[122] Woodhead was elected Honorary Fellow of the Henry Phipps Institute, Philadelphia, which was founded for the study, treatment and prevention of tuberculosis.[123] In 1908, he exhibited a collection of specimens at the sixth International Congress on Tuberculosis, which showed the changes produced by tuberculosis in various organs both in humans and animals. For the collection he was awarded a Gold Medal.[124]

Tuberculosis was also the focus of Woodhead's research in comparative pathology. He was a member of the Royal Commission on Tuberculosis, which was formed in 1902, with the aim of settling the well-known dispute between Robert Koch and John McFadyean.[125] At the International Tuberculosis Congress taking place in London in 1901, Koch presented a paper, arguing that human and bovine tuberculosis were different diseases and the main source of transmission of human tuberculosis was heredity rather than the intake of the milk and flesh of tuberculous cattle. McFadyean criticized Koch's view and argued that the intake of tuberculous

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[121] Other articles included 'The Relationship between Human and Bovine Tuberculosis' in 1908-10; 'The Avenues of Infection in Tuberculosis' in 1910; 'An Address on the Relations between the Human and the Bovine Tubercle Bacillus, Delivered at the International Conference on Tuberculosis at Rome' in 1912; 'The Relation of Bovine Tuberculosis to Human Tuberculosis' in 1912-13; 'Quasi-continuous Temperature Records in Healthy and Tuberculous Bovine Animals, especially in Relation to the Tuberculin Test' in 1915; 'The Tuberculous Soldier' in 1917 etc.

[122] James Mackenzie, 'Obituary of Sir German Sims Woodhead', *In Memoriam: Sir German Sims Woodhead*, p. 39.

[123] Clifford Allbutt, 'Obituary of Sir German Sims Woodhead', p. 35.

[124] Ibid.

[125] Ernest Cotchin, *The Royal Veterinary College London: A Bicentenary History*, London, The Royal Veterinary College London, 1990. p. 123.

milk or meat was the main cause of human tuberculosis. After the Congress, a Royal Commission was appointed to test Koch and McFadyean's conflicting views. Both McFadyean and Woodhead were members of the Commission. The Commission conducted a great number of experiments, in some of which McFadyean and Woodhead were involved. After ten years, the Commission endorsed the English view.

In fact, before the 1901 Congress, Woodhead's own research on the disease had already contrasted with Koch's view. In 1894, seven years before the Congress, Woodhead delivered an address, 'The Channels of Infection in Tuberculosis', at the North London Medico-Chirurgical Society. In the address, he argued that infection by inhalation was only a secondary source of transmission. The primary cause of the disease, Woodhead argued, was ingestion of tuberculous materials. Post-mortem examination, said Woodhead, indicated that alimentary tuberculosis was common in children. He inferred that the corresponding tuberculous material taken by the children was milk.[126] With regard to the role of heredity, Woodhead remarked:

> I shall not here speak of heredity, which must, except in so far as the general condition of the tissues is concerned, play an altogether unimportant part in the spread of tuberculosis, and can only be classed, along with insufficient and imperfect food and generally defective hygienic conditions, as a predisposing cause of tuberculosis.[127]

Four years later, in his article, 'The Bacteriology of Tuberculosis', Woodhead repeated that "all statistics point to the fact that tuberculosis is a disease which is contracted after birth – a most comforting knowledge for families in which

[126] German Sims Woodhead, 'The Channels of Infection in Tuberculosis', *The Lancet*, 1894, ii: 958-959.
[127] Ibid., p. 957.

tuberculosis has been rife" and maintained that ingestion of tubercle bacilli contained in milk was a main cause of tuberculosis in children.[128]

In 1912, Woodhead delivered an address to the Section of Bacteriology and Comparative Pathology of the Berlin Congress (of the Royal Institute of Public Health). In the address, he explained to the German pathologists why he, as well as other English pathologists, concluded that the intake of tuberculous milk or meat was the major cause of the transmission of the disease. He presented three case studies, which he regarded as characteristic examples of British research.

The first study was of the North of Scotland. In a large lunatic asylum, there was an unusual high death-rate from tuberculosis.[129] Woodhead examined the asylum and found that "the institution was well built, well ventilated, and kept exceedingly clean".[130] However, after examining the farm animals of the asylum, he found that "two of the cows supplying milk to the patients were found to have enlarged hard udders, and the milk drawn from them was swarming with tubercle bacilli".[131] "The pigs on the farm", Woodhead added, "were found to be suffering from generalized tuberculosis".[132] Several measures were taken, including clearing out the stock, disinfecting the farm building, and breeding new stock. Later, the death-rate from tuberculosis returned to normal. All this, said Woodhead, indicated that the intake of the contaminated dairy product was the cause of the high-death rate.

The second study took place in Edinburgh, at the time when Woodhead was appointed Pathologist to the Royal Hospital for sick children.[133] At the Hospital,

[128] German Sims Woodhead, 'The Bacteriology of Tuberculosis', *The Practitioner*, 1898, lx: 596.
[129] Woodhead did not specify the period in which the high mortality occurred. He only mentioned that "many years ago…" For details, see German Sims Woodhead, 'Address to the Section of Bacteriology and Comparative Pathology of the Berlin Congress, 1912 (of the Royal Institute of Public Health)', *Journal of State Medicine*, 1912, xx: 710.
[130] Ibid.
[131] Ibid.
[132] Ibid.
[133] Ibid.

Woodhead had the opportunity to do post-mortem examinations on a large number of children. The result, he stated, was as follows:

> I found marked evidence of the extension of a tuberculous process from the alimentary canal to the glands at the root of the lung, and thence to the lung, or from the tonsils to the glands in the neck, and thence, when apical adhesions were present, to the apices of the lung – a condition I afterwards noted in swine infected experimentally.[134]

To investigate the disease, Woodhead and John McFadyean examined a great number of Edinburgh cow-houses. Of the first six hundred cows examined, at least one percent had tuberculous udders (Woodhead demonstrated tubercule bacilli in the milk by microscopic observation).[135] "[I]n nine out of fourteen cases of tuberculous udders examined", Woodhead added, "tubercle bacilli were present in enormous numbers".[136] All this led Woodhead and McFadyean to conclude that "the large amount of alimentary tuberculosis amongst the poorer children in Edinburgh might not be unconnected with the amount of infective material contained in the milk of the Edinburgh supply".[137]

In the third study, Woodhead referred to E. Sydney St. B. Sladen and Kanthack's research on the milk supply in Cambridge, which indicated that the presence of tubercle bacilli in Cambridge milk was common. To this Woodhead added, "it is an exceedingly interesting fact that in Cambridge, glandular tuberculosis, and tuberculosis of what may be called the scrofulous type, is of comparatively frequent occurrence".[138] Woodhead also noted that in the first four or five years of his residence at Cambridge, he saw "more cases of Addison's disease – with tuberculous

[134] Ibid., pp. 710-711.
[135] Ibid.
[136] Ibid.
[137] Ibid.
[138] Ibid., p. 711.

suprarenal capsules" than in the whole of his former experience of post-mortem examinations.[139]

Having presented the case studies, Woodhead explained why the English and German pathologists would hold contrasting views concerning the nature and the transmission of tuberculosis. The main difference, he said, was that English people drank raw milk whereas in Germany milk was well-cooked before it was consumed:

> [i]n England,...until recent years such [milk] as was taken was not cooked in any way. In Germany, it may be that where milk is consumed it is cooked before it is taken and for this reason you may have less infection that with us.[140]

Such a difference should not be overlooked, said Woodhead. The relatively small number of cases of alimentary tuberculosis in Germany might lead the German pathologists to neglect bovine tuberculosis as a source of the human one:

> Finally, as the mortality and morbidity of pulmonary tuberculosis is higher with you than it is with us, it may be that you are justified in taking a proportionately less serious view of the danger of bovine infection than are we on our side of the water.[141]

Woodhead's conclusion indicated his sympathetic understanding of why Koch made the statement which surprised English pathologists in 1901. In short, Woodhead was not antagonistic to the German pathologists. Comparing the British and German studies on tuberculosis, he tried to remove the apparent contradictions between them. He also suggested that pathologists should consider more factors, such as "the custom as to sterilization of milk"; "the climatic conditions as affecting man and beast"; and even "the prevalence of preliminary gastro-intestinal disturbance and

[139] Ibid.
[140] Ibid., p. 712.
[141] Ibid., p. 713.

alterations of the tonsils and of the adenoid tissue composing the naso-pharyngeal ring".[142] As more factors were considered, he said, a clearer view of the whole picture would be obtained.

In England, veterinarians recognized the importance of comparative pathology earlier than physicians. This was because the former dealt with diseases in various kinds of animals, such as horses, cattle, dogs and cats; and therefore had a great deal of opportunity to compare disease manifestations in different kinds of animals. It was argued that, in England, veterinarians were the first to detect and show concern about the transmission of tuberculosis from animals to humans through the intake of contaminated dairy products.[143]

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[142] Ibid.

[143] In *The Lancet* (1888), there was a debate between medical officers and veterinarians about who contributed more on the aetiology of certain diseases. The President of the Yorkshire Veterinary Medical Society wrote a letter to the editor, complaining the medical officers of health and inspectors, who, he claimed, knew little about veterinary medical practice and disparaged veterinary medicine. In response, the editor defended the officers and inspectors as follows:

> ...but we would remind him (the President) that much that is known as to the pathology and aetiology of the diseases of the lower animals, as they affect man by way of food or otherwise, had been the result of the labours of officers of health and other medical men under whom the inspectors work; and that even at the present juncture, when such questions as the development of scarlatina from a bovine disease, or the relation of bovine to human tuberculosis, have arisen, it has been members of the medical profession who have taken the initiative in studying and discussing the subject. There is nothing we should value more than the co-operation of veterinarians skilled in the pathology and aetiology of disease. (Anonymous (editor), 'The Veterinary and Medical Sciences', *The Lancet*, 1888, i: 288.)

Later that year, James Lambert, a veterinary surgeon, wrote to the editor to discuss the same issue. Lambert claimed that with regard to diseases such as scarlatina and tuberculosis, the veterinarians "had a great deal to contribute to what is known". (James Lambert, 'The Veterinary and Medical Sciences', *The Lancet*, 1888, i: 395.) He argued that the veterinarians were the pioneers of the aetiology of tuberculosis. According to Lambert, as early as 1873, Dr. George Fleming, Principal Veterinary Surgeon to the Army, and M. August Lydtin, veterinary adviser to the Government of Baden, had written a paper on "the influence of heredity and contagion in the propagation of tuberculosis, and the prevention of injurious effects from the consumption of the flesh and milk of tuberculous animals". (Ibid.) Also, in 1874, Fleming had contributed a paper, 'Tuberculosis from a Sanitary and Pathological Point of View', to *The British and Foreign Medico-Chirurgical Review*. Lambert held that Fleming was the first to draw attention to tuberculosis in animals, its nature, transmissibility, and the danger to public health from its existence. The debate showed that the veterinarian seemed to be the pioneers of the aetiology of tuberculosis in England.

My final example is a veterinary surgeon, Frederick Hobday.[144] This example, however, is not about zoonoses. It is Hobday's anatomical study. Hobday was the second President of the Section of Comparative Medicine of the Royal Society of Medicine. He succeeded Allbutt in 1924 and held the position until 1926. Hobday did a great deal of substantial work to found the Section. In 1921, he had delivered a lecture on 'Observations on Some of the Diseases of Animals Communicable to Man'.[145] He made use of the lecture to promote comparative pathology. The lecture, as Penelope Hunting remarks, resulted in a combined meeting between the Royal Society of Medicine and the Central Branch of the National Veterinary Medical Association on 14th February 1921, followed by another one in March, entitled 'The Eradication of Tuberculosis from Man and Animals', in which Allbutt, McFadyean, and Hobday were speakers.[146] Hobday also wrote to the Secretary of the Royal Society of Medicine to assert the importance of a Section of Comparative Medicine. In an organizing committee chaired by William Hale-White, the President of the Society, Hobday formally proposed the formation of the Section. In the minutes of the organizing meeting, the following was noted:

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[144] Hobday was born in 1870 at Burton-on-Trent. His interest in veterinary medicine, it is said, was aroused by a chance visit to a veterinary practice after he left school. His father arranged for him to study the subject through an apprenticeship. In 1892, he qualified and became a house surgeon at the Royal Veterinary College London. A year later, he was appointed, by the College, Lecturer in materia medica, animal hygiene, therapeutics and dietetics. Later, he developed an interest in the use of local anaesthetics and chloroform as a general anaesthetic for animals. (Cotchin, *The Royal Veterinary College London*, p. 139.) He was influential in popularizing the use of anaesthetics in veterinary practice. He also specialized in abdominal surgery, particularly in cryptorchidy. (Anonymous, 'Obituary of Major Sir Frederick T. G. Hobday', *The Veterinary Record*, 1939, li (no. 26): 816-817.) Hobday's post at the College lasted until 1899, when the College was in deep financial trouble. After he left the College, he started private practice at Kensington, as a junior partner of Frank Ridler. (Cotchin, *The Royal Veterinary College London*, p. 141.) During the First World War, he was in the army reserve and was called up to the military veterinary service. He was appointed Veterinary Officer to the 1st King Edward's Horse Regiment. He was also Consulting Surgeon to the Veterinary Hospitals on the Northern Front. In 1915, he was appointed to command Number 22 veterinary hospital at Abbeville. The hospital was also unofficially called 'Major Hobday's Hospital'. (Ibid.) After the war, Hobday returned to his London practice. He was Editor of *Veterinary Journal* from 1905 to 1939. He was elected to the Council of the Royal Veterinary College London from 1910 to 1914 and from 1925 to 1937. In 1927, he succeeded McFadyean as the Principal of the College.

[145] Penelope Hunting, *The History of the Royal Society of Medicine*, London, Royal Society of Medicine, 2002, p. 365.

[146] Ibid., pp. 365-366.

> The office of President should be held [alternately] by a representative of human medicine and by a representative of veterinary medicine, and that the Members of the Council and other Honorary Officers should be appointed on the same principle; namely, half representing human medicine and the other half representing veterinary medicine.[147]

It was agreed that the first President should be a man concerned with human medicine. Allbutt was elected.[148] Most of the veterinarian members in the early years were introduced by Hobday to the Section.[149]

The first General Meeting of the Section of Comparative Medicine began with Allbutt's Presidential Address, which was followed by Hobday's presentation of his paper, 'Cryptorchidism in Animals and Man'. Cryptorchidism was a disease in which one or both of the testicles failed to descend into the scrotum. It was common in animals and humans. According to Hobday, cats having such a disease would pass urine with objectionable smell;[150] diseased dogs had an irritable temper and were restless;[151] and diseased horses had treacherous disposition to the riders.[152] Hobday distinguished between two kinds of cryptorchidism: (1) monorchids – animals with one testicle anatomically missing; and (2) anorchids – those with both testicles anatomically absent.[153] The latter, according to Hobday, were almost valueless in the agricultural market.

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[147] *Meeting Minutes of Royal Society of Medicine (Section of Comparative Medicine)*, Royal Society of Medicine, p. 4.
[148] Hunting, *The History of the Royal Society of Medicine*, p. 366.
[149] Ibid., p. 365.
[150] Frederick Hobday, 'Cryptorchidism in Animals and Man', *Proceedings of the Royal Society of Medicine*. 1924, xvii (part 1&2): 4.
[151] Hobday's view was based on comparisons of the diseased animals before and after the removal of the problematic testicles. He found that the animals would become more docile after successful surgery. (See Ibid.)
[152] Ibid., p. 7.
[153] Ibid., p. 4.

Hobday presented a number of specimens, sketches and photographs of horses with hidden testicles. He also used the diagrams of foetal development of horses to explain the causes of cryptorchidism. According to him, there were several possible causes of the disease. For instance, at a particular foetal stage the peritoneal attachment might be abnormally short or abnormally long. In the former case, the testicle "would never descend from position in the lumbar region, but become almost a fixture".[154] In the latter case, the peritoneal attachment "might not reach the internal inguinal ring just at the time when this aperture would be sufficiently relaxed to admit of its passage" and "it might not reach it at all but be pushed out of its place by some of the internal organs".[155]

Hidden testicles, according to Hobday, usually appeared abnormally large and cystic. The epididymis was often excessively large or mis-shapen. Other parts, such as the inguinal canal and the spermatic artery, were also defective. In the case of the horse, monorchids were found to be able to procreate; but anorchids were always sterile.[156]

Hobday also discussed a variety of other abnormalities of testicles found in horses. For example, he presented a sketch of a cystic dermoid containing both hair and bone taken from a 'cart colt' at one year old. The general characteristics of the abnormalities, as Hobday summarized, were as follows:

> These abnormalities vary from the size of a walnut to the size of an ordinary Rugby football, and contain such foreign bodies as worms, hair, cartilage, osseous or dental structures, and various kinds of tumour tissue. They may be very cystic or very hard and cirrhotic. They may be entirely

[154] Ibid., p. 6.
[155] Ibid.
[156] Ibid.

degenerated and adherent to the peritoneum or to some abdominal organ.[157]

Hobday also compared cryptorchidism in horses and humans. (He said that his knowledge of human cryptorchidism was from a text-book of human surgery.) He noted that varieties of neoplasm were occasionally found in human testicles but were very common in those of horses.[158] Whereas dentigerous cysts could sometimes be found in the ovaries of women, they were rare in the testicles of man. Such a phenomenon contrasted sharply with the cases in domesticated animals and horses, in which dermoids and dentigerous cysts were common in the testicles and ovaries of horses.[159]

The most important point in Hobday's paper was that he regarded heredity as a main cause of cryptorchidism in animals and asserted that this was overlooked in human medicine. Hobday did not present any statistical evidence for his view concerning animals. He regarded it as common sense for veterinary surgeons and horse breeders:

> The tendency for a horse with one testicle retained and one in the scrotum to produce progeny having similar defects is well recognized not only by the veterinary surgeon but by every intelligent breeder of pedigree stock...[t]hat the abnormality can be passed on through the female line is also well recognized, and a filly foal which has been got by a unilateral cryptorchid sire must always be an object of suspicion if put to the stud.[160]

[157] Ibid., p. 8.
[158] Ibid., p. 13.
[159] Ibid., p. 14.
[160] Ibid., p. 4.

In the light of his experience in veterinary surgery, he encouraged his colleagues in human medicine to consider heredity as a cause of defective testicles in humans:

> ...and I again especially emphasize the hereditary tendency of cryptorchidism in animals; as I understand that, although I read that about in every 500 men has his testicles misplaced, the question of it being hereditary as far as man is concerned is not generally accepted.[161]

Hobday's study indicated that the use of the comparative method could open up new dimensions for considering aetiological questions.

To conclude this section, comparative pathology, it was claimed, benefited medicine by providing new angles to explain the occurrence of morbid phenomena. With reference to diseases in animals and plants, physicians could have a more comprehensive understanding of diseases as biological processes. They might also come up with new explanations of human diseases, which might eventually facilitate therapeutics and prevention. For instance, if cryptorchidism was an inherited disease, then controlled breeding would be an effective way to minimize its transmission (both in animals and in humans). Comparative pathology required physicians to de-centralized human pathology from their intellectual framework; to consider biological phenomena in animals and plants; and to relate diseases in humans and animals by the use of evolutionary perspectives. It was in this sense that comparative pathology was non-anthropocentric.

[161] Ibid., p. 14.

5 Important Journals for comparative pathology and the Section of Comparative Medicine of the Royal Society of Medicine

Apart from conducting research, late nineteenth-century comparative pathologists also disseminated their knowledge through publication. In this respect, there were two journals which deserve close attention: *The Journal of Comparative Pathology and Therapeutics* and *The Journal of Pathology and Bacteriology.*

The Journal of Comparative Pathology and Therapeutics was founded by John McFadyean in 1888. McFadyean was a graduate of the Royal Veterinary College Edinburgh. After graduating in 1876, he was appointed Lecturer in anatomy in Edinburgh and published *The Anatomy of the Horse.*[162] In 1892, he was appointed Professor of Pathology and Bacteriology by the Royal Veterinary College London, the first veterinary institute in England, founded in 1791.[163] In 1894, he was made Principal to the College. Two years before his appointment, the College had established a pathological laboratory.[164] McFadyean wanted to ground veterinary medicine on a scientific basis. He did a great deal of bacteriological research, particularly on tuberculosis, in the laboratory. The commercial production of tuberculin and mallein in the laboratory also helped the finances of the College.[165]

The Journal of Comparative Pathology and Therapeutics was an important site for veterinarians to publish their papers. Independent studies of the same disease in different animals and comparative studies of diseases frequently appeared in the

[162] Cotchin, *The Royal Veterinary College London*, p. 118.

[163] The history of the Royal Veterinary College London was well-documented in various accounts, such as Ernest Cotchin, *The Royal Veterinary College London: A Bicentenary History*, 1990; Anonymous, *The Royal Veterinary College London, 1791-1991,* London, The Royal Veterinary College London, 1991; Richard C. Hankins, 'The Development of University Veterinary Education in Liverpool and London', *Veterinary History*, 2001, xi: pp. 103-120.

[164] Hankins, 'The Development of University Veterinary Education', p. 122.

[165] Anonymous, *The Royal Veterinary College London, 1791-1991*, p. 11.

journal. For instance, in volume two (1889), there were two articles on the manifestations of echinococcus cysts in different animals, namely, 'Echinococcus Cysts in the Liver of the Horse' and 'Echinococcus Cysts in the Liver of a Cow'. In the same volume, there was a comparative study of glanders in animals, 'Transmission of Glanders to the Rabbit and Goat'. There were also a number of articles on pleuro-pneumonia, including 'Experiments Regarding Pleuro-pneumonia in Germany'; 'Experiments in Queensland Regarding Preventive Inoculation in Bovine Pleuro-Pneumonia'; and 'The Eradication of Pleuro-pneumonia from Holland'. In volume eight (1895), there were several articles on rabies, such as 'Rabies in India'; 'The Diagnosis of Rabies' and 'The Symptoms of Rabies in Sheep'. Moreover, there was an article on the comparative study of the use of cocaine in different animals, 'The Therapeutic Uses and Toxicological Effects of Cocaine on the Horse, Dog and Cat'. In volume eleven (1898), comparative studies, such as 'Relationship between Human and Bovine Tuberculosis' and 'On the Pathology of Some Specific Granulomata in Horses and Cattle', were published. Articles on comparative pathology in other volumes included, for instance, 'Oriental or Bubonic Plague in Certain of the Lower Animals' (volume fourteenth, 1901); 'Five Cases of Hodgkins's Disease in the Lower Animals' (volume sixteen, 1903); 'The Relations of Avian and Mammalian Tuberculosis' and 'The Transmission of Tuberculosis from Animals to Man through the Medium of Milk and its Prevention' (volume seventeen, 1904); and 'Recent Experiments as to the Infection of Man with Animal Diseases' (volume eighteen, 1905).

Apart from McFadyean's journal, *The Journal of Pathology and Bacteriology* was another important forum for comparative pathology. It was founded in 1893 by Woodhead and Y. J. Pentland, an Edinburgh publisher. It consisted of articles of a wide range of topics, including physiology, pathological anatomy, bacteriology, chemical and biochemical investigations and comparative pathology.[166] Articles on comparative pathology and animal pathology were regularly included in the journal. For instance, in volume three (1894-96), Joseph Griffiths contributed an article, 'Observations on the Absorption of the Tadpole's Tail'. In the article, Griffiths remarked that the study of the absorption of the tadpole's tail would shed light on the understanding of tissue changes in humans:

> ...the changes observed in the process of once functional parts are of interest, not only to the biologist but also to the pathologist; for these changes, seen in a pronounced degree in the tadpole's tail, are in all probability similar in kind, though greater in degree, to the changes that are constantly going on during the growth of the body from the early ovum, during the maintenance of the various tissues at their proper standard, and during the decay of the tissues in old age as well as in the different forms of atrophy observed under diseased conditions, and in the absorption of inflammatory and other products.[167]

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[166] In the journal, articles on physiology and histology included, for instance, James Mackenzie's 'Pulsations in the Veins, with the Description of a Method for Graphically Recording them' (volume one, 1892-93); and Edwin Goodall's 'The Spider (so-called Scavenger) Cell of the Brain: an Experimental Inquiry' (volume two, 1893).

Articles on pathological anatomy included Hugh Walsham's article, 'Some Observations on Tuberculosis of the Cervical and Bronchial Lymphatic Glands' and Joseph Griffiths' 'Fibro-Cystic Tumour of the Breast, in which the Majority of the Cysts are Lined by Stratified Epidermis-like Cells' (volume seven, 1900-1901).

There were a great number of articles on bacteriology, such as Alexander Lockhart Gillespie's article, 'The Bacteria of the Stomach' (volume one, 1892); Kanthack and John William Watson Stephens' article, 'The Escape of Diphtheria Bacilli into the Blood and Tissues' (volume four, 1896-97); William Bulloch's article, 'The Durability of Passive Diphtheria Immunity' (volume five, 1898); Myer Coplans' 'Heat Production by Micro-Organisms' (volume fourteen, 1909-10); and A. Stanley Griffith's article, 'Further Investigations on the Strains of Tubercle Bacilli Isolated from Cases of Lupus' (volume eighteenth, 1913-14).

Chemical and biochemical studies occasionally appeared. For instance, in the first volume (1892-93), there was an article, 'A Chemical Examination of a Case of Anthrax in Man', written by Sidney Martin. In the eighteenth volume (1913-1914), we can find T. G. M. Hine's article, 'Biochemical Reactions of Diphtheria-like Organisms'.

[167] Joseph Griffiths, 'Observations on the Absorption of the Tadpole's Tail', *The Journal of Pathology and Bacteriology*, 1894-96, iii: 142.

In the fifth volume (1898), G. Bellingham Smith and John Wickenford Washbourn contributed an article, 'Infective Venereal Tumours in Dogs'. The authors held that they aimed to use their study to reveal the infective nature of the disease in other animals:

> Since the beginning of the year 1896 we have had under observation a series of contagious tumours on the genital organs of dogs. The contagium is conveyed in the act of coitus, and the tumours are in this respect comparable to the venereal tumours met in man. This series seems to us worthy of putting on record, not only from the light it throws upon the etiology of venereal tumours, but also as a slight contribution to the general question of the infective nature of tumours.[168]

Apart from disseminating comparative-pathological knowledge, the journal was Woodhead's weapon for promoting experimental pathology in England. In his own article, 'The Position of Pathology among Biological Sciences' (1893), Woodhead argued that comparative pathology was best pursued by the experimental method:

> It was recognized that in comparative pathology there was the ground-work of an experimental pathology, which would allow of much greater accuracy of observation than could obtain in the case of disease of the human subject: in animals the conditions might, to a certain extent, be controlled, and the effects of certain causes of disease might be studied in different species, and in such species the disease processes might be examined at different stages of development.[169]

[168] G. Bellingham Smith and John Wickford Washbourn, 'Infective Venereal Tumours in Dogs', *The Journal of Pathology and Bacteriology*. 1898, v: 99.
[169] German Sims Woodhead, 'The Position of Pathology among Biological Sciences', *The Journal of Pathology and Bacteriology*, 1892-93, i: 491.

Woodhead's emphasis on the use of the experimental method should be understood in a wider context, as a reaction against 'dead-house pathology', a term used by Abraham Flexner to describe late-nineteenth-and-early-twentieth-century English pathology (refer to chapter two.)

In 1923, the Section of Comparative Medicine of the Royal Society of Medicine was founded and it marked the official recognition of comparative pathology by human medicine.[170] The Council of the Section consisted of a President, the immediate Past-President, eight Vice-Presidents, two or more Honorary Secretaries, a Representative on the Library Committee and sixteen other members.[171] The normal tenure of the President was two years. Allbutt was the first President but he presided over the Section for only one year. This may have been due to his age of eighty-seven, two years before his death.[172] The Section had two kinds of meetings: General Meetings and Council Meetings. The General Meetings were usually run in the form of presentation and discussion of papers, with occasional Presidential Addresses. The papers and discussions were published in the *Proceedings of the Royal Society of Medicine*.

The Council (of 1923) consisted of members from various backgrounds. They included physicians, pathologists, surgeons and veterinarians. The Vice-Presidents included Hobday, Layton Blenkinsop (veterinarian), Leonard Rogers (pathologist), George Henry Wooldridge (veterinarian), Joseph William Brittlebank (veterinarian), William Hale-White (physician), William Boog Leishman (physician) and John

[170] Although the Incorporated Liverpool Institute of Comparative Pathology was founded by Rubert Boyce in 1902, it was registered as a company, funded mainly by Liverpool animal traders and lasted only for two years. (Hankins, *The Development of University Veterinary Education*, pp. 110-112.) When compared with the Section of Comparative Medicine of the Royal Society of Medicine, this institute cannot be said to make comparative pathology recognized in human medicine.
[171] *Council Minutes of Royal Society of Medicine (Section of Comparative Medicine, 1923)*, Royal Society of Medicine, p. 13.
[172] During his presidency, Allbutt was not active in the Council Meetings. There were five Council Meetings for 1923-24 but he only attended the first one. Of the General Meetings, he chaired four out of six.

Moore (physician). The Honorary Secretaries were Adrian Stokes (pathologist) and James Basil Buxton (veterinarian). Other Council Members included Andrew Balfour (pathologist), William Henry Willcox (physician), Stewart Ranken Douglas (surgeon and pathologist), Charles Frederick Sonntag (surgeon), George Percy Male (veterinarian), Walter George Spencer (surgeon), Geoffrey Herbert Livesey (veterinarian), Aldo Castellani (physician and bacteriologist), Geoffrey Herbert Livesey (veterinarian), Walter George Spencer (surgeon), D'Arcy Power (surgeon), John W. McIntosh (veterinarian), George Dunlop-Martin (veterinarian), W. Dunlop Smith (veterinarian), W. Hamilton Kirk (physician) and Colonel A. J. Williams (physician). Many of the Council Members, such as Leishman, Rogers, Stokes, Castellani, Wilcox, Douglas, Sonntag and Dunlop-Martin, possessed experience in pathological research overseas, such as in India, France, Belgium and Africa, through joining the Royal Army Medical Corps (R.A.M.C.) or other military services or British expeditions. Such opportunities for overseas research were partly created by the Great War. Other members, such as Power, Buxton and Spencer, were also active in laboratory work in Britain. In short, by including such experimental pathologists as members, the Council made comparative pathology more experimental and enlarged the scope of diseases to be investigated.

6 Conclusion

In this chapter, I have discussed Allbutt's efforts to transform English medicine from an anthropocentric art of healing to a biological science. What was special in Allbutt's argument in 'On the Classification of Diseases' was that he did not justify comparative pathology on utilitarian grounds, i.e., he did not emphasize the benefit of comparative-pathological research. Rather, he adopted an epistemological approach. In his account, he made use of evolution, neurology, embryology and bacteriology to build up a theoretical foundation for comparative pathology. His evolutionist approach created a continuity between humans and animals, which served as common grounds for comparisons, the notion of which was often assumed but seldom demonstrated in other accounts before Allbutt's.

Allbutt's use of the non-utilitarian and theoretical approach in his account can be seen as an exemplar of integrating medicine into the basic sciences. The choice of the title, 'The Integration of Medicine', for his 1923 Presidential Address was not arbitrary. The integration of medicine into the basic sciences, in Allbutt's eyes, was not simply the employment of theories, experiments and instruments. It was the embodiment of medicine into the theoretical and structural framework of biological science, just like his framing of comparative pathology. This involved a re-categorization of the relation between medicine and the basic sciences and a change of the concept of medicine.

With reference to Paget, Bland-Sutton, Woodhead and Hobday's research, I argued that certain substantial knowledge was exclusively made by comparative pathologists. For the dissemination of such knowledge, the journals run by advocates of the subject played an important role. Finally, the establishment of the Section of Comparative Medicine at the Royal Society of Medicine marked an official recognition and the institutionalization of comparative pathology in human medicine.

Chapter Six

Conclusion

In the previous chapters, I have argued that Allbutt's importance in the history of English medicine was not limited to his service in various institutions such as Cambridge University, the MRC and the British Medical Association. I have argued that his major achievements were, rather, intellectual, including his physiological and biological thinking in medicine, his advocacy of clinical research, the unification of physic and the basic sciences, the physiological concept of disease, and comparative pathology. I have argued that Allbutt was a leading figure in the intellectual reform of late nineteenth-century English medicine.

In chapter two, I discussed Allbutt's criticisms of the empiricist and routine character of English medical practice. The case-taking method, Allbutt held, made medical students uncritical and unreflective. To remedy this shortcoming, he advocated clinical research. With reference to his ophthalmic and thermometric research, he demonstrated the importance of bringing a 'research spirit' to clinical practice and how instruments can be used for research purposes. His *On the Use of the Ophthalmoscope* should not be seen as simply an introduction of the ophthalmoscope. It was Allbutt's weapon in his fight to change the role of the physician from a healer to an investigator of diseases. I have also argued that, for Allbutt, instrumentation and experimentation were not isolated activities. Both could maintain the research spirit and foster the 'scientific investigator'. I have explained how Allbutt endorsed this view by his praise for Robert Boyle's experimental work. My case study of Allbutt also suggests that clear-cut historiographical boundaries, such as those postulated by Nicholas D. Jewson might bury the complexity of the development of medicine.

In chapter two I argued that Allbutt blurred the boundary between the physician and the pathologist and in chapter three I discussed his further attempts to break down the conventional professional boundaries between physic, surgery and the basic sciences. Allbutt's advocacy of clinical research, his protest against the division between physic and surgery and his support of the hospital unit system should be regarded as part of a continuous effort to cultivate a scientific medicine and to construct a new image of the medical man as a scientific generalist. Conceptually speaking, this required a tremendous re-categorization. In the light of this, it is justifiable to regard Allbutt as a revolutionary medical thinker.

While in the second and the third chapter I focused on Allbutt's re-modelling of English medicine, my discussion in chapter four of his criticism of the morbid entity view of disease and his advocacy of the physiological concept reveals that beneath this was a theoretical re-modelling. His promotion of the physiological view of disease should be seen as a way of introducing into English medicine, German physiological thinking which saw the morbid-anatomical tradition as unscientific. This introduction should be regarded as Allbutt's reaction to contemporary English medicine, whose empiricist character, as Allbutt conceived it, facilitated an inculcation of 'loose clinical slang' in medical students by their teachers. I have also discussed Allbutt's criteria of a scientific concept of disease with reference to his appreciation of Jean Martin Charcot's work on hysteria, his view of the relation between medicine and religion, and George Henry Lewes' criticism of Charles Darwin's use of figurative language. These criteria, I further argued, can be seen to conform to Auguste Comte's model of the history of ideas.

The last aspect of Allbutt's intellectual reform concerns his biological thought: his criticism of the anthropocentric character of contemporary pathology and his promotion of comparative pathology as a step to making medicine a biological science. I have argued that in his argument for comparative pathology Allbutt made use of evolution, neurology, bacteriology and embryology to build up a theoretical foundation for the discipline. This approach, when compared with the utilitarian one that he held was adopted by his contemporaries, makes Allbutt distinctive. Allbutt's evolutionary analysis of disease in humans and animals also injected a biological character into medicine. Through my discussion of the research of James Paget, John Bland-Sutton, German Sims Woodhead and Frederick Hobday, I have argued that comparative pathologists exclusively demonstrated substantial new pathological facts and contributed thereby to the making of medical knowledge. The rise of comparative pathology, I suggested, should be understood in a context in which the advocates of experimental pathology were challenging the London pathologists, who were mainly physicians and surgeons sustaining the morbid-anatomical tradition.

I have also discussed how Allbutt appealed to history to support his medical views. For him, the ideal physician was also a historian who should be able to draw insight from the past to safeguard the development of medicine. For nineteenth-century medical scholars like Allbutt, the past was an important source of justification of their viewpoints, and medical history seemed to be a powerful argumentative tool. Such a view was certainly drawn upon from historicism.

My discussion of Allbutt and his associates indicates that physiologically-and-biologically-minded physicians and pathologists viewed the medical world in a new way. Below, I explain this new perspective in terms of three different senses of the word 'continuity'. In physiological medicine, the idea of continuity or 'changes through time' was very important. As noted in chapter two, Virchow criticized morbid anatomy for lacking a 'time dimension' and therefore being unable to reveal the causes of lesions with certainty. In contrast, animal experiments, in which diseases were investigated on a time axis, allowed patho-physiologists to understand them as *continuous* processes. Whereas in dead-house pathology diseases were given specific seats, and lesions, which were static representations of the results of disease, were the focus of the 'medical gaze' in Michel Foucault's terms, in patho-physiology, continuous morbid processes during life became the new focus of the medical gaze. In an animal experiment or in diagnosis with an instrument which could 'anatomize' the living, the medical investigator aimed to construct a continuous picture of structural or functional changes during life. For instance, the ophthalmoscope could be used to reveal nervous changes during life through the eye. The thermometer allowed the medical investigator to note changes in body temperature within a period of time, and graphical instruments could provide qualitative presentations of morbid changes through time. In short, temporal continuity was an essential element in the medical perception of physiologically-minded clinicians and patho-physiologists.

The replacement of the idea of disease as morbid entity with that of deviation from the normal demonstrated the second sense of continuity. In physiological medicine, as in Hippocratic medicine, health and disease were continuous. Advocates of physiological medicine saw health and disease as a continuum. The morbid entity view, which implied that disease was an all-or-nothing matter, was, in patho-physiologists' view, simply mistaken. Health and disease, for patho-physiologists, were reversible states and their task was to *convert* a pathological state back to normal, rather than to *defeat* it.

The third sense of continuity was demonstrated in Allbutt's characterization of comparative pathology. Allbutt used the idea of evolution to establish a *continuity* between humans and animals. This continuity created common ground between human and animal diseases and legitimized comparative studies of them. One important implication of the establishment of such a continuity, according to Allbutt, was that it eliminated the anthropocentric character of contemporary English medicine. Whereas in anthropocentric medicine, human disease was the main concern of medicine, the object of medical research and the source of medical knowledge, in comparative pathology it was regarded as a member of a disease series. The understanding of this whole series, in Allbutt's view, could only be achieved by studying the biological whole, with the use of the comparative method. The relation among species, rather than individual ones, was at the heart of comparative pathology. It was also one of the characteristics of biology. Biologists do not study a particular species of animal in isolation only; they study a species of animal in relation to other species, their ancestors and the environment. In short, the establishment of the continuity between humans and animals de-centralized human diseases in pathology and created an equality, in the biological sense, between humans and animals. This creation changed the scope of medical practitioners' medical gaze.

I do not argue that the adoption of such a new perspective required a dramatic 'paradigm shift'. I only suggest that medical practitioners who regarded medicine as a biological science had a different medical perception whose nature I have analysed. My analysis, of course, does not exhaust all kinds of changes in the transformation of medicine from the art of healing to a biological science. I would rather regard it as an example that demonstrates the value of studying individual medical practitioner's medical thinking. Such an area of research, as I have claimed, has not yet been fully explored in the modern historiography of medicine.

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