THE ROCK CARLING FELLOWSHIP

1981

Reflections on the Universities and the National Health Service

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REFLECTIONS ON THE UNIVERSITIES AND THE NATIONAL HEALTH SERVICE

Sir Fred Dainton, FRS

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The Rock Carling Fellowship
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to the late Sir Ernest Rock Carling,
for many years a Governing Trustee
of the Nuffield Provincial Hospitals Trust
and Chairman of the Trust's Medical
Advisory Committee

Each holder of the fellowship
will seek to review in a monograph
the state of knowledge and activity
in one of the fields in which Sir Ernest
had been particularly interested and which
is within the purposes of the Trust.
The arrangements provide that the
monograph will be introduced by a
public lecture to be given at
a recognized medical teaching centre
in the United Kingdom

THE AUTHOR

Chancellor since 1978 of the University of Sheffield where he was born in 1914, Sir Fred Dainton is a chemist interested in the mechanisms and rates of chemical reactions, especially those induced by light or nuclear radiation. Following graduation at Oxford he migrated to Cambridge to become H. O. Jones Lecturer in Physical Chemistry and Fellow of St Catharine's College before becoming professor in Leeds in 1950. In 1965 he moved to Nottingham as Vice-Chancellor where one of his prime tasks was to establish the first new medical school in the United Kingdom since 1893. In 1970 he returned to Oxford as Dr Lee's Professor of Chemistry, and he was also Chairman of the Council for Scientific Policy. After three years at Oxford he then moved to the Chairmanship of the University Grants Committee (1973–8). In 'retirement' he is now also Chairman of the British Library Board, the National Radiological Protection Board, and of the Royal Postgraduate Medical School.

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PREFACE

When I was asked to give the Rock Carling Lecture I experienced, in rapid succession, pride, dismay, and finally, a slow realization that perhaps there was a topic on which I might contribute something appropriate to the Rock Carling Lecture series.

I was proud because when I was a young Professor in the University of Leeds taking an interest in, amongst other things, the effects of ionizing radiations on living systems, some senior Leeds colleagues arranged that I met Rock Carling in London. The vivid impression he created then remains with me still and I therefore felt, and still feel, proud to be asked to contribute to a series of lectures which were in part intended to perpetuate the memory of a man who had such sharpness of mind tempered by great kindness and wisdom.

Dismay followed quickly, prompted by a rising awareness of my lack of any medical qualification and, therefore, of ever having experienced that awful responsibility, which a doctor exercises daily when he gives advice to a patient on treatment which may enhance or detract from that well being which we call good health. Without that experience how dare I write or say anything which I knew from the outset was likely to be read or heard by doctors?

On reflection, it occurred to me that the quality of the contribution of the medical profession to the health of the nation depends, above all, on two things; the nature of the doctor's medical education in both its primary preregistration phase and its subsequent continuing postgraduate phase and whether the organization within which, as employees or freelance contractors, most doctors work enables the doctors' skills and knowledge to be deployed to best advantage. In Britain doctors receive their primary training entirely under the aegis of universities which, however, do

not own, operate, and control the hospitals in which the clinical part of the primary training and almost all post-experience training are given. These hospitals belong to the National Health Service. Health care now and in the future is critically dependent on the extent to which the universities and the hospitals take account of and support each other's purposes. Since the operating and capital costs of both types of institution are almost entirely met from public funds the tax-paying citizen would perhaps assume that their co-operation would be automatic and, if not, enforceable by government. However, it is a feature of the United Kingdom system of government that universities and hospitals are administered at arms length from government and therefore enjoy measures of autonomy designed to protect them from direct ministerial intervention in their affairs and, consequently, except in very extreme circumstances, also from control. Moreover the taxpayers' money comes to the hospitals and to the universities from two different but large departments of state.

Such contemplation evoked the thought that perhaps here was a subject worth consideration in a Rock Carling Lecture. Obvious questions to be examined were whether primary medical education should be a university monopoly; whether the teaching hospitals should be owned and run by universities; the extent to which the hospitals and the universities, being separate, should yet participate in each others governance. These and related matters could, I thought, be probed by someone who was not a doctor. Perhaps there were advantages in being an 'outsider looking in' and particularly in being a natural scientist since modern medical practice rests to a considerable degree on scientific knowledge and will do so to an ever increasing extent in the future. So I slowly found arguments to persuade myself to do what I always knew I would enjoy doing.

My abiding interest in medical education was first stimulated by being one of the early recipients of the very labile form of penicillin, the repetition rate of the injection of which was so high that I felt like a pin cushion in a

dressmakers workshop. I was intrigued by the fact that none of the doctors who prescribed and administered this treatment could tell me how it worked its beneficent magic. This made me inquisitive about the rationale of medical practice. My curiosity received further impetus when I had to substitute, during his sabbatical leave, for the Fellow of my College who was Director of Studies in Medicine and who also pointed out to me in the College library the beautifully made, multi-drawer medicine cabinet bequeathed to the college of which he had been a Fellow by John Addenbrooke, Founder of Addenbrooke's Hospital, Cambridge. In my brief period as 'locum' Director of Studies I became aware through the students' 'gray books', countersigned by the appropriate demonstrator or lecturer in anatomy, of the long hours of rote-learning in that subject which they had to endure and how poorly this process gave the students any notion of the relationship between form and function in the human body and how inadequate a vehicle it was to enlarge the general powers of the mind, which is one of the purposes of true education. On translation to Leeds in 1950 I became a year or two later, by what I then regarded as malice prepense of the administration, a member of the Faculty Board of Medicine which was still in considerable measure dominated by clinical consultants who were very part-time members of the university teaching staff. From this vantage point I saw something of the relationship between a university and the Board of Governors of its Teaching Hospital and, as a member of the curriculum committee, began to suspect that there was a real though unstated assumption in the minds of the part-time clinicians that the weight to be attached to a particular subject in the clinical part of the curriculum should be determined by the bed allocation in that speciality in the teaching hospitals rather than vice versa.

In these circumstances it seemed unlikely that there would be much support for a critical re-examination of the medical curriculum and even less likely that any radical proposals which might emerge from such a study would be

accepted. Those opposed to change were also resistant to expansion of the numbers of medical students and their view was powerfully reinforced by the report of the Willink Committee which maintained, mistakenly, that Britain was over-producing doctors. It is an irony of history that this conclusion really made the reform of medical education possible. The view that fewer doctors were needed permeated school sixth forms so that able young people on the science side avoided medicine as a career choosing instead physical and biological sciences in which subjects universities were expanding and employment prospects good. Applicants to medical schools declined in quantity and quality and medical schools found the competition to attract the best intensifying. The consequent necessity to make undergraduate medical schools more attractive proved a powerful spur to change which could not be ignored and was further strengthened when it was decided that Willink was wrong and that in addition to increasing the size of existing medical schools new ones should be created. The latter offered the possibility of innovation *ab initio* unfettered by the inertia of the past. To become, as I did in 1965, the Vice-Chancellor of the university charged with the responsibility of forming the first of the new schools was therefore to be presented with two challenging opportunities; to take a fresh look at the curriculum and to devise new relationships between the university and the teaching hospitals.

To share in these activities were two aspects of my Vice-Cancellarial life which I greatly enjoyed. However it soon became clear that, fascinating as this work was, there were limits to the freedom of action we possessed. These limits were set, quite properly, at the national level; policy is made at the centre and we at the periphery had to accept the constraints imposed by these decisions. In particular whilst, within the bounds set by the General Medical Council, considerable latitude in the style and content of the curriculum is possible, that fostering of a critical and enquiring attitude to medicine which can only happen if the staff are actively participating in research is critically

dependant on resource allocation decisions made at the centre by government and agencies like the University Grants Committee, the Advisory Board for the Research Councils and the individual Research Councils themselves. Similarly an appropriate balance has to be found in providing the clinical resources needed for teaching and research and the planning and delivery of health services according to need. These were issues forced upon my attention in the last decade and a half of my full-time employment, after leaving Nottingham.

The conclusion I drew from this retrospection was that here were two great publically funded services, the Health Service and the universities, each having many separate objectives but having a stake in education and research in medicine. Yet within each of the two services there seemed to be too few people who understood the major problems and purposes of the other. To judge from conversations with friends and neighbours most citizens were even less well informed about both. Neither of these conclusions should cause any surprise for our preoccupations are those dictated mainly by our employment and particular interests. Yet there can be very few persons in this country who have not received attention from a doctor either at school, home, his surgery or a hospital. Most are grateful for the doctor's ministration and assume that there is some mechanism by which their doctor's competence to practice the healing art is developed and certified but evidently even in these days, there are few citizens who have given much thought either to the education of doctors or, the service within which they work. It seemed to me that a short book describing the universities and the Health Service might therefore serve a useful purpose and I accepted the Trustees' invitation.

The form of the book then began to take shape. The starting point was that the practice of medicine is the application of scientific and other knowledge to the maintenance of a state of well being in human individuals. At the outset, therefore, it was necessary to be agreed on the nature of scientific knowledge and its importance to the

education of doctors. It is this importance which provides the real justification for universities being the *only* places in Britain where doctors now receive all their primary training and, increasingly, much of their continuing education. The universities also have a prime duty to advance knowledge by research. For these reasons it seemed desirable to give some account of the history of the development of British universities with special reference to their medical teaching and research roles and to attempt an assessment of the present position. The role of the Research Councils, particularly the Medical Research Council, in guiding and financing some of this research also called for comment. Then, because the vast majority of practising doctors use their skills within the National Health Service and rely on the back-up services which it provides, some simple account of the National Health Service and its origins would be necessary in so far as this related to the main theme. The final question to be faced was that of the adequacy of the interdigitation of the two services and whether any reforms are needed to improve it.

I have been extremely fortunate in the last thirty years to have had opportunities to learn from many people wiser and more experienced than I. I have little doubt that what may be good in this book emanated originally from them. There are many others whom I have specifically consulted but who are too numerous to mention. To all I offer my warmest thanks and free them from possible embarrassment by declaring that no one except myself is responsible for the views expressed. Two persons, one dead and one living, I will refer to by name. The late Professor Sir George Pickering FRS instructed me in more ways than he knew. I came to know him well and, for me, he epitomized the highest standards of medical practice. His diagnosis of and prescription for his patients' maladies were informed by the best scientific knowledge he could command but he managed them and their immediate family with a great compassion and warm humanity which shone through a certain bluntness of manner. The book is dedicated to my

wife, who over eleven years laboured in the vineyards of Hospital Management Committees, a Regional Hospital Board, and a Regional Health Authority and from this experience taught me through connubial conversation more about the hopes, fears, and attitudes of those who work in the National Health Service than I could have acquired unaided.

1

The university setting

WHY IT IS RELEVANT

Humans are sentient, emotional, locomotory, bipedal, social, and cognitive animals of relatively feeble physical power. Their distinguishing characteristic is the immense power and range of their brains which, on the one hand, have enabled them to escape from many of the constraints limiting the other members of the animal kingdom, whose destinies are largely environmentally determined, and, on the other hand, have created many of their problems. It is the mind which can store and recall past experiences and observations, the evidence of the senses, and, by contrasting them with similar present events develop the idea of a universal time-frame in which every event has its place. Using his brain a human being can correlate remembered sensations of sound, touch, smell, sight, hearing, and pain bringing them together into patterns in time and space of ever widening compass. The brain perceives that patterns often recur, that it is in the nature of things that one kind of event, whether accidental or contrived, is always followed by another and particular event. This sequence is a challenge to the brain to devise 'explanations' of these connections between cause and consequence. These intellectual constructs are called scientific theories which serve the dual purpose of linking together attested facts, whether about themselves or about the external world, bringing them into coherent, understandable systems incorporating cause and effect and enabling the prediction of the unknown. New theories supplant old theories because they are more comprehensive in the range of information they can encompass but they survive only until a new fact is encountered which defies incorporation into the theory

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when it must be modified or, if that proves impossible, be rejected and replaced by a better theory.

The human impulse to gain knowledge and understanding through the ascending repetitive spiral of observation, hypothesizing, testing, revision and, if necessary, rejection of the hypothesis or its replacement by a new one, has as its mainspring that irrepressible quest for self-identification which also impels human beings to write poetry or prose, to compose and perform music, to paint, to sculpt, to do all those things which relate to the affective side of their being. So science on the one hand and art, music, and literature on the other are all human activities driven by a common human need. They make demands on the intellect and personality of the human performers which resemble more than they differ. However, although science and other human activities enhance self-knowledge they are divergent in their effects. Non-scientific ideas transmitted in words and encapsulated in symbolic signs, slogans and music may, and frequently do, move men to great actions to extend or defend their territory, to change their social organization and habits. However, only by the application of empirical and scientific knowledge can Man enhance his physical power, harness external sources of energy, protect himself from the elements and disease, and transmit messages or goods (including himself) over long distances at high speeds. The effects of 'science-in-action' are not, as many suppose, merely physical like the examples given in the previous sentence but can also include profound effects in the realm of ideas or the way in which humans think. In the first place, as the instantaneous electronic media illustrate, science enables ideas to circulate much more rapidly and, in response, lifestyles and attitudes change more quickly, regional differences are eroded and the rate of social change is accelerated. More significantly many social codes were accepted in the past because Nature imposed penalties for their infringement. When science establishes the means to avoid such physical penalties the social codes and values can be and often are abandoned. There is an interesting passage

in one of Max Perutz's lectures which exemplifies the great liberating influence of science. He remarks that the provision by science of contraception and household technology has been the means by which the Women's Liberation Movement has succeeded and that when we come to the condition of the common man 'there is a great difference between the approach of the priest, the politician, and the scientist. The priest persuades humble people to endure their hard lot, the politician urges them to rebel against it, and the scientist thinks of a method that does away with the hard lot altogether. By doing so, science has brought about the freedom of which Karl Marx wrote 'it begins where drudgery ends' . . . so that in many countries the Marxist dictum that we 'combine a greater degree of freedom only by enslaving other men' is being disproved by science. There no longer exists the ruling class in these countries bound to oppress and fight the ruled and political power is no longer as Marx expressed it 'the organized power of one class suppressing the other'.

Science is a living memorial to human cognitive power. It not only exemplifies the Cartesian maxim 'cognito, ergo sum' but reminds us that, having contributed to shaping what we are, it can also be used to mould what we become. Such a potent force for change would not be expected to be without an effect on medicine and history confirms this. Medicine grew out of the correlation of observations and the early doctors diagnosed and prescribed on the basis of empiricism, and where that failed, they relied on dogma and magic. Empiricism has its proper place in the development of any subject and leads to the formulation of rules which are useful even though the reason why those rules exist is unknown. Indeed empiricism is still alive and well today in medicine. The recent discovery by the Chinese of a male contraceptive in unrefined cotton seed oil rests upon such modern empiricism. Whatever the utility of empiricism it can never produce those great leaps forward in understanding of mechanisms relating effect to precedent cause which are necessary in every subject if it is to advance. Biology and

with it medicine made this step over a period during which it was slowly accepted that the laws of physics and chemistry, acknowledged as valid for inanimate matter, were equally applicable to living systems and thus removed the necessity to believe in some irrational life force, a 'vis vitalis'. Diagnosis and treatment of physical illness have thus come to be increasingly scientific and successful and doubtless the same will, in due time, happen to mental disease. Our present knowledge enables us, individually and collectively, to live more wisely and thus prevent or at least defer the incidence of much ill-health and devise and apply remedies for many of those diseases, avoidable or unavoidable, to which we become subject.

Medical practice and education can only be good and become better if they are based on a sound education in the natural sciences. However, since patients are not isolated specimens but belong to families living in larger social groups and since they also have very varied personalities, the doctor needs to know something of the behavioural and social sciences if he is to manage his patients successfully. Moreover, there will be occasions in his life when the doctor faces difficult decisions involving questions of law, ethics, or human values. The only institutions in which this wide range of physical, biological, behavioural, and social sciences as well as the arts and humanities are taught and advanced are the universities, the evolution of which to their present state will now be discussed.

THE ORIGINS AND TRADITIONS OF BRITISH UNIVERSITIES

A former Vice-Chancellor of the University of Liverpool[1] has successfully condensed into the following luminous paragraph the essential truths about universities:

> Knowledge at the highest level is the domain of universities; their function is to preserve it, hand it on and expand it. This is inherent in their nature and confirmed by their history. The relative emphasis on these three aspects of their work as the handmaids of truth has necessarily varied from age to age; for universities are part of the society

in which they function and they are only viable if they respond, in ways consonant with their nature, to the implied needs and the positive demands of changing cultural, social, economic and political environments. Wisdom they may foster, but cannot teach; and though not indifferent to the training of character, they must in the main regard it as a prior responsibility of home, church, and school. The knowledge with which they are concerned is that which is ascertainable by human reason and observation; prophesy and revelation are outside their orbit, though theology is not. Their attitude is of necessity critical; they tend to be radical rather than conservative; they are seminaries for new ideas and a sanctuary for unpopular opinions; freedom of thought and expression is essential to their existence.

The sentence about viability has a double significance if account is taken of the fact that universities cost money. There is no country in which universities can survive without *financial* help from the state whether this is in the form of direct subsidy, or payment for services rendered, or indirectly through state help given to students some of which, as tuition fees, finds its way into the universities' coffers. This dependence of the universities on the state is relatively recent in the United Kingdom. How it came about is part of the history of higher education in the United Kingdom to which we now give attention as a necessary prelude to examining what universities are in practical terms. Before doing so it is appropriate to draw attention to the final sentence I have quoted from Sir James Mountford's writings. A corollary to this sentence is that in a free society there must be freedom of thought and expression. The universities are the ultimate defenders of this intellectual liberty and cannot serve the nation well unless they have academic freedom which in turn requires a measure of financial autonomy. Yet governments and parliaments, in voting money for specific purposes, seek not only public accountability for the way in which the money is spent but through the spending departments of state they aim at *control* in detail of the decisions to spend the money in particular ways. There is therefore an area of potential discord between government and universities in which government, by insisting on detailed financial control of universities, could frustrate one of the purposes for which they exist and

for which government subsidises them and the universities, by using their autonomy irresponsibly and ignoring national needs as articulated by government, invite government intervention in their affairs.

If the universal human spirit of enquiry is not to be frustrated institutions are needed where knowledge can be conserved and studied and where older and more experienced people will teach the young and inexperienced whilst at the same time attempting to add to the store of knowledge by research and to re-evaluate past knowledge through scholarly and critical study. In Europe the Greeks and the Romans had seen this clearly enough but the lamp of learning which they kindled was well nigh extinguished during the Dark Ages. Only the church was able to keep this lamp just alight in its cathedral schools. By the twelfth century Latin had become the universal language of learning and this made possible the wider dissemination of knowledge in philosophy, medicine, and law and it was then that the earliest universities in Europe came into existence. The word *universitas* then simply meant a collection or guild of scholars often given legitimacy in the form of a Papal Bull. It did not imply that this group of scholars aimed to cover the whole range of learning. Indeed many of the initial institutions were restricted to a single subject although they drew their students from all over Europe; thus Salerno and Montpellier were famous for medicine.

Until 1167 would-be students from the British Isles had to go to continental Europe. This became impossible in that year when Henry II, as part of his quarrel with Thomas à Becket, decided to prevent them and to force those students and teachers living abroad to come home. Some of these returning scholars came to settle in Oxford from which a group migrated to Cambridge. Initially, masters and scholars found what accommodation they could but over the years wealthy benefactors, often ecclesiastical or royal, founded colleges as acts of piety or penance or merely to exercise patronage. From the beginning colleges were independent self-governing communities with masters re-

sponsible for teaching the scholars and they have remained so ever since. For three centuries the core of the curriculum was the *trivium* (grammar, rhetoric, and logic), and the *quadrivium* (arithmetic, geometry, astronomy, and music). A most important function of the university, as the corporation of masters became known, was to examine and certify successful candidates in these subjects and in lesser degree to provide some instruction in them. The Renaissance caused a great expansion of learning and reformed this narrow curriculum in all European universities and, in addition, Oxford and Cambridge had to contend with the difficulties of the Reformation. The state in the form of the monarch, Elizabeth I, began to take a direct interest in the affairs of the universities remodelling their constitutions in 1571 and she founded Trinity College, Dublin, in 1592. Despite the disturbances of the Civil War the beneficial effects of the Renaissance continued; science began to develop and in Oxford could be found men like Hooke, Boyle, Halley, and Wren, all early members of the Royal Society of London founded in 1660 and distinguished geometers or scientists. Towards the end of the seventeenth century universities began to sink into sloth and corruption which continued throughout most of the eighteenth century. Oxford and Cambridge remained closed communities with religious entry tests, jealously defending and enlarging their territories, possessions, and temporal powers. They were relatively isolated from society so that nepotism and corruption found a hospitable environment within their ancient walls. It was not surprising that Edward Gibbon[2] could write truthfully of the Fellows of Magdalen College, Oxford that they were 'decent, easy men who supinely enjoyed the gifts of the founder' and referring to his own experience in that college wrote 'I spent fourteen months at Magdalen College; they proved the most idle and unprofitable fourteen months in my whole life. That prominent London physician, John Fothergill,[3] a tough-minded Yorkshire Quaker who graduated from Edinburgh, commented sadly on Oxford in 1769; 'I do not think anything would give me more pain than to

reside a few months in Oxford. There I should find men of the first rank of understanding engaged in an idle round of that which the lowest mankind can enjoy as much as themselves; eating, drinking and sleeping.' Until the mid-nineteenth century both universities saw their prime function to educate the sons of the ruling class or those who wished to enter the learned professions of the law, medicine, and the church, then more of a profession than a vocation. Research and scholarship were far from being recognized as a duty of those who lived and worked in these two universities. Their reform had to wait until the nineteenth century when 'honour schools' were established with prescribed courses of study, properly conducted examinations were instituted, and the colleges became more outward looking, and, as the result of Royal Commissions, three Acts of Parliament (1854, 1856, 1877) their administration was reformed. Universities still saw themselves as producing future rulers increasingly not only of the United Kingdom but of its Empire overseas. Neither university made any significant contribution to the creation of national wealth through the Industrial Revolution. The builders of Britain's roads, railways, canals, ships, docks, bridges, and engines for pumping or traction or power looms and so on were not graduates of Oxford and Cambridge.

Though Scotland began with three ecclesiastical foundations, St Andrews (1410), Glasgow (1451) and Aberdeen (1494) it was Edinburgh Town Council which founded its own college in 1583, which acquired university status in 1621, so that by this last date Scotland had twice as many universities as the much more populous England. Moreover, the Scottish academic tradition was quite different. The universities were unitary and non-collegiate. They cherished an ideal that grew into one of practical service to the community thereby producing the people to enable the society to work (and incidentally helping to create a school system far in advance of that in England) and they represented a route for the able child, whatever his origins, to progress to the highest levels of knowledge. The

professors were valued for what they knew and for what they could transmit to others. They educated good doctors and lawyers and thought deeply about their subjects so that at a time when Edward Gibbon was complaining about Oxford, Adam Smith was writing his *The wealth of nations* in Glasgow and Joseph Black MD was lecturing on chemistry in Edinburgh to students of medicine from the university and apprentices from the factory and the workshop who often had little or no preparation suitable for such a course but were prepared to study diligently. Black realized their importance in the industrial and economic order of the days to come. He also busied himself with chemical research at a time when there was virtually no research in this subject in either Oxford or Cambridge and the only contemporary British chemist to take advantage of Black's research was Joseph Priestley, who used Black's burning glass in the discovery of oxygen and, a few years later, the non-graduate professor of chemistry at the Royal Institution in London, Humphry Davy, who isolated the element magnesium, Black having previously characterized its oxide (magnesia alba).

In the nineteenth century new influences bore on English universities which were to change them greatly. Reaction against religious tests led to the establishment as a joint stock company of the 'godless' University of London now University College, London. Incidentally one of the initiators of this was Lord Brougham who had been enormously impressed by Joseph Black's lectures in Edinburgh. Theology was excluded from the curriculum of this new institution which was also non-residential, in marked contrast to Oxford and Cambridge. Action provoked reaction. Three years later representatives of the Establishment (the Archbishop of Canterbury, the Prime Minister, and Sir Robert Peel) with others succeeded in getting a Royal Charter for King's College in the Strand as an Anglican college of higher education and which, like University College, also had its Hospital Medical School. Because neither college could grant degrees it was necessary

to invent an institution to perform this function. So in 1836 the University of London was established whose only powers were to examine and confer degrees on students attending approved institutions in the United Kingdom. For this purpose it received a small annual grant of £4000 from the Government.

Over the next hundred years the constitution of London University was amended in ways which enabled it to give instruction and to bring together into a federation not only University and King's Colleges but other older institutions such as some of the medical schools and some later foundations like the London School of Economics and Political Science and Imperial College. In retrospect it is astonishing that the capital city of a great empire was for so long without a university but once it was established it grew rapidly. Not only did it make a very large contribution to the number of graduates who pursued full-time study at one of its constituent colleges but through its power to grant 'external London' degrees to those studying at approved institutions it effectively nursed into university status many young university colleges in England and the overseas dominions. The requirement that students attend an approved institution was relaxed in 1858 for all subjects except medicine so that from that date forward London external degrees could be obtained by exclusively private study. This too was a landmark in higher education in the United Kingdom which future historians will perhaps regard as the beginning of the distance learning idea incorporated in the Open University.

Alarm in the Church of England at the establishment of University College was not confined to the southern archiepiscopal Province and six years later the Dean and Chapter of Durham Cathedral, combining virtue with self-interest, founded University College, Durham as the first element in what was to be a collegiate university, though the teaching was to be centrally organized and controlled. Durham University and the slightly older St David's College, Lampeter were the last two university level

institutions to be founded by the Church of England or Wales, and in the hundred years following their foundation neither grew very quickly so that by the outbreak of the Second World War the Durham Colleges only had approximately 400 students.

Durham was the last university to be founded for about fifty years during which period, however, about ten colleges were founded mainly in manufacturing or mercantile cities. These were the forerunners of the big civic universities. The founders of these colleges were groups of local notables in the professions, manufacture, commerce, and often too in local government. Some were animated just by a wish to bring enlightenment to the locality; many more saw higher education in utilitarian terms as providing both the knowledge and the trained manpower needed by local industry and, to this day, this is reflected in the specialities which some of the civic universities offer, e.g. Leeds in textile science, Sheffield in metallurgy and glass technology. Newcastle in nautical engineering. In that sense the university colleges could be regarded as outgrowths at a higher level of the Mechanics' Institutes, hundreds of which existed throughout the country and which had been founded to provide useful and practical instruction for artisans in evening classes. Others amongst the founders may have seen in the establishment of a local college an opportunity to avoid the abuses and corruption of Oxford and Cambridge and they may have had the same motive that inspired the founders two centuries earlier of the dissenting academies. However diverse the motives of the founders the results were much the same. The courses on offer generally included certain elements of the humanities and always pure and applied science. Their strength in science was what attracted and made possible amalgamation with the local medical schools as will be described in a subsequent chapter. There were no religious tests for entry. Since the colleges were not empowered to grant degrees they prepared their students for the external London degree which made for a certain uniformity of courses and a desirable maintenance of

standards but inhibited some local academic initiatives. One of the most significant features common to all university colleges and to the University of Edinburgh which distinguished them from the other universities was the large lay influence in their government.

Financially all the new university colleges were in a very fragile state, depending on fee income and interest on endowments to meet their running costs. Both the endowments and buildings had to be provided by local benefactors. Only one received any form of government aid at its foundation. This was Aberystwyth in 1882. All survived and reached university status, some before the Second World War and which are often known as the Old Civics (Manchester, Liverpool, Leeds, Sheffield, Birmingham, Bristol, Newcastle, and Reading) and some after the Second World War which are sometimes known as the New Civic universities (Dundee, Hull, Nottingham, Leicester, Southampton, and Exeter). Similar movements in Wales which had led to the establishment of colleges in Aberystwyth, Bangor, Cardiff, and Swansea culminated in the establishment of the federal University of Wales, the constituent colleges of which are similar in general constitution and purposes to the civic universities but with a special Welsh ethos.

In some ways the Second World War was a watershed for British universities. In the last of the inter-war years only one per cent of the 18-year-olds in Britain became university students. Few scholarships existed, including 200 paid for each year by the state, and none met the full costs. There were almost exactly 50,000 full-time students, almost half of whom were concentrated in Oxford, Cambridge, and London, with 20 per cent in Scotland and 5·5 per cent in Wales. The running costs of the whole system amounted to a mere £6·7m and, although 31 per cent of this total income was provided by direct government grant 30 per cent of the income was derived from fees and as much as 18 per cent came from gifts or interest on endowments. In the post Second World War era this general

pattern changed dramatically. The university system increased to six times its pre-war size and all except a very tiny fraction of its income now comes directly or indirectly from the state. In addition to becoming the major paymaster the state has also become the major policy determinant, deliberately planning a university 'system' in which the size and range of faculties of each university is effectively decided centrally as are the number, location, and subject-mix of any new universities.

The reasons for this greater role of the state are not far to seek. In the first place university graduates made a vital contribution to the war effort, not only in defence science, research and development, but they also contributed significantly to problems of strategy and intelligence through their development of operational research and new methods of cryptography, not to mention the manning of the Civil Service which had to run a strictly planned economy. After the War it was obvious that financial survival depended on the best use of the available human and material resources and this inevitably meant an expansion of the higher educational system, particularly in science and technology. Views of this kind were first articulated in the Barlow Report[4] of 1946. The immediate post-war expansion of the university system was to meet the needs of the returning soldiers, sailors, and airmen whose chance of a university education had been removed by the war. Several other factors contributed to the pressure of demand for an expansion of higher education. First there was the development of secondary school education as a result of the Butler Education Act[5] of 1944 which brought about an increase in the number of school pupils staying on into the sixth form, thereby greatly enlarging the pool of potential applicants for university places. Secondly, there was the increasing ease in the 1950s with which students could secure financial help from their local authority to enable them to go to a university; this culminated in 1957 in the acceptance of the 'mandatory principle' by which every successful university applicant was deemed to be

entitled to receive a means-tested financial award. Thirdly, there was the great increase in the birth-rate in the immediate post-war years which was creating an increase in the size of the 18-year-old age group which would peak in the mid-1960s. Finally, the Royal Commission,[6] which had been set up by government under the chairmanship of Lord Robbins to enquire into higher education generally, reported in 1963. Although much of the report was statistical in character, a few principles were enunciated which were very much in tune with the mood of the country. The first was that courses of higher education should be available for those able and willing to enter them. The second was that students who had successfully pursued any course of degree level standard wherever it was given should be awarded a degree; this carried the implication that a Diploma in Technology awarded by the recently established National Council for Technological Awards to successful students completing courses in Colleges of Advanced Technology should be replaced by a degree.

The effect of all these social forces was the transformation of a number of Colleges of Technology into Technological Universities (Heriot-Watt, Strathclyde, Bath, Aston, Brunel, City, Loughborough, Bradford, Salford, and Surrey) and the establishment of nine 'brand new' universities on 'green field' sites (Stirling, Ulster, Sussex, Kent, York, East Anglia, Lancaster, Essex, and Warwick). The history of this expansion would make a fascinating narrative and raise many questions about higher education some of which are unanswered even today.[7] It will not be told here simply because medical education was never a factor making any significant impact on the demand for expansion of higher education and none of the institutions listed as having been created in the post-war era has had any activities which could be regarded as anything more than merely peripheral to the mainstream of medical education being confined to developments in, for example, bio-engineering and medical physics. The plain truth of the matter is that medical education was a steadily declining fraction of university

work during the post-Second World War expansion. Thus just before that war began 27 per cent of students in British universities were in faculties of medicine and dentistry, but by the time the Robbins report was issued that percentage had fallen to 12 per cent. The only other statistical change of comparable magnitude relating to 'student-mix' during the same period was the percentage of students who were postgraduate which rose from 6 to 15 per cent. This represented an even greater increase in the proportion of postgraduate research students because many of the postgraduate students recorded within the 6 per cent were taking wholly taught courses leading to diplomas, such as the Diploma in Education and their numbers had not undergone such a large increase during the same period.

RESEARCH IN BRITISH UNIVERSITIES

Today it is widely accepted that a major function of British universities lies in the field of postgraduate education and research and the expectation that members of staff will be engaged in research has become formalized as a duty specified in their contract of service with the university. It was not always thus. In fact the idea of research as a necessary activity at the university came to Britain by a circuitous route. In every day and age there are always a few persons of genius whose passion to know cannot be denied expression whatever their institutional setting. Even in Oxford and Cambridge, when these universities were at their lowest intellectual ebb there were some Fellows of colleges who did distinguished work. But very often that work was disregarded by many of their more slothful academic colleagues in the same subject and for the discussion of their ideas they turned to societies which they formed which were devoted to the advancement of knowledge, like the Royal Societies of London and Edinburgh, the Lunar Society of Birmingham and many of the literary and philosophical societies served the same function for scientists in provincial cities and towns. Universities did

not provide either laboratories or money for scientific research. The dedicated scientist either paid for the apparatus he needed out of his private pocket or sought a wealthy patron.

In Europe the concept of a university was changing. If there is one event which more than any other can be regarded as the beginning of this transformation it is the establishment in 1810 of the University of Berlin. The Director of the Prussian State Department of Culture and Education had a clear vision of a university as the natural home of research and scholarship in which the professors should uphold the principle 'of looking upon science as something not quite yet discovered, never completely solved and unceasingly to seek it as such.' When he was authorized to found a university in the Prussian capital city he stipulated that the professors should engage in systematic enquiry and should have satisfactory conditions to do so, which, in his view, meant not only physical facilities of libraries and laboratories but also time for quiet thought in solitude (Einsamkeit) and complete freedom (Freiheit). Science, in Humboldt's mind, was equated with Wissenschaft, which includes all knowledge, not merely natural science. The idea rapidly permeated other German universities because of its effectiveness in accelerating the acquisition of new knowledge. Professors liked it because distinction in research attracted able students to work with them, often led to a call [Berüf] to a more prestigious Chair, or the building of a special research institute. It benefitted research and scholarship, new areas of knowledge were pioneered, rapidly expanded and found their way into the undergraduate curriculum. As progress in the physical sciences led to useful practical applications the state saw clearly the desirability of encouraging scientific research in the universities and linking it closely with research in industry. However, political unrest forced many able European scholars and scientists to emigrate and lack of opportunity also drove many able young Scots in the same westward direction to the United States of America. The

Scots carried the ideal of practical service and continental Europeans, especially Germans, took the notion that research is an essential ingredient of any university. This migration could not have been better timed. American universities had been slow to accept the idea of even science as a part of their curriculum. Thus it was as late as 1802 that the first Chair of Chemistry was established; in Yale University. But a country that was developing its natural resources to manufacture goods for an expanding economy needed new knowledge and well-trained engineers and scientists who could use that knowledge. Scottish and German immigrants made notable contributions towards meeting those needs. By the beginning of the twentieth century graduate studies were reasonably well established in some large American universities, both state and private, but many young Americans and Canadians sought what they considered to be the best in postgraduate training in Germany where they could also be rewarded for their diligence and ability with a doctor's degree which had not only a cash value in their home country but brought the holder an enhanced social status.

No such degree existed in Britain. Before the First World War the degrees of English universities were awarded in most faculties at three levels; Bachelor, Master, and Doctor. At most British universities other than Oxford and Cambridge a Mastership was obtained by a period of advanced study or research, which for a full-time student would extend over one or two years at the end of which he would pass a further examination and present an acceptable thesis. The Doctor's degree in Faculties other than Medicine was of quite a different order. It indicated that the holder had a substantial record of distinguished, independent contributions to knowledge based on many years of work. This requirement for a long period of study put the English doctorate out of range of any graduates from the United States or Canada who could only afford, say, two or three years in Britain. The question was therefore posed privately amongst academics and semi-publicly by the President of

McGill University at the First Congress of the Universities of the Empire held in 1912 as to whether Britain would institute some kind of junior doctorate substantially equivalent to the German or the American PhD. Following the outbreak of war and the involvement in it not only of the colonies but also the United States of America, influential people in Britain, including H. A. L. Fisher, former Vice-Chancellor of Sheffield and then President of the Board of Education, felt that when the war was over citizens of those nations would no longer want to go to Germany for postgraduate study and, particularly those from the British Empire, would prefer to complete their education in Britain. For this reason and, prodded by Fisher, the universities moved relatively swiftly so that by the time of the Peace Treaty the PhD degree was firmly established in British universities. It is one of the ironies of academic history that this innovation did not lead, as had been hoped, to a large influx of postgraduate students from Canada, the United States and other countries overseas. By that time many of them were able to find what they needed nearer home. What the PhD degree did do for British universities was to provide a postgraduate qualification which was to be much sought after by both British and overseas students especially those from the developing countries. It created a new student constituency, the research students, and to meet their needs research was institutionalized. As so often is the case, once started, the movement gained its own momentum and after circa 1930 few academic staff appointments in science were made in Britain of persons who did not hold a PhD degree. Research and the training for it had come to stay in the British university. They proved increasingly expensive and created financial problems which the universities could not solve without government help. How government came to the aid of the universities in their teaching and research is described in the next chapter.

2

The involvement of the state in university education and in research

A. UNIVERSITIES

THE RELUCTANT PAYMASTER

The University Colleges established largely by local enterprise in the last century were ultimately to become the old civic universities which, more than any other kind of institution, took the strain of the great expansion of the university system in the 1950s and 60s. Not long after their foundation many of them were in vary parlous financial circumstances and might have failed. That they did not but were rescued by small financial grants-in-aid made by the government led by a series of incremental steps to a system of state support for universities that preserves essential academic freedoms in a manner which commands the admiration and envy of many other countries and which has served this country well, at least until 1980.

The precedent for help from the state was set many years ago in Scotland. The four Scottish Universities had enjoyed small grants from the Scottish Government and, following the Act of Union, Westminster continued these grants, finally consolidating them into a total sum of £5,000 per annum in 1831. When the University of London was founded in 1836 the government made a grant of £4000 solely for the purpose of meeting the costs of organizing and administering the examinations. For nearly half a century subsequent governments were more flint-hearted. They turned deaf ears to the appeals for money from Owens College, Manchester which had been established as a college

Notes and references begin on p. 161.

for men in 1851. But in 1882 the government made a small grant to University College, Aberystwyth in no small measure due to the tenacity of purpose of Sir Hugh Owen and thousands of Welsh folk in that part of the Principality who had contributed their mites to the establishment of the College and were determined that it should not fail.

Equal steadfastness was shown by the founding fathers and the principals of the University Colleges in the large cities of England which were in dire financial circumstances. In 1884 on the voyage home from their attendance at the meeting of the British Association for the Advancement of Science in Montreal, Ramsay, (later Sir William Ramsay FRS) the Principal of University College, Bristol and the Principal of Firth College, Sheffield (Professor W. M. Hicks FRS) decided to launch a campaign to secure government help. This campaign lasted seven years and endured many vicissitudes including the defection of Leeds, Manchester, and Liverpool, then federated as the Victoria University, following their successful direct appeal to Goschen, Chancellor of the Exchequer in 1888, which culminated in the Victoria University receiving a sum of £2000 per annum. Scientists like Sir Lyon Playfair, Sir William Tilden, and Sir Henry Roscoe (who was also briefly an MP) were prominent in the campaign and strong public support was also forthcoming from the Master of Balliol College, Dr Benjamin Jowett, who was a staunch friend of University College, Bristol and therefore of Ramsay. Jowett stated in a letter to *The Times* that a sum of £100,000 should suffice.[1] Deputations representing eleven University Colleges made representations first to the Chancellor of the Exchequer in 1887 and later to the Vice President of the Council on Education (Sir William Hart Dyke MP). The support of local and national MPs was enlisted to ask questions in the House of Commons. Finally, success was achieved and on 11 March 1889 the following press announcement was made

The Chancellor of the Exchequer has finally decided to allot an annual

sum of £15,000 in aid of local colleges. The amount will appear in the Estimates for the coming year. The sum asked for was £50,000.

This terse note was followed by a Treasury minute[2] of the same date which also set up a Committee to select the institutions to be benefitted and to recommend the sums which each should receive. This Committee consisted of three MPs, one of whom was also the only scientist (Roscoe) and two clerics, one the Headmaster of Rugby School and the other the Disney Professor of Classical Archaeology in Cambridge. In the event ten University Colleges received a share of the total sum and one supplicant, Hartley University College, Southampton was refused any support.

The Committee did its work well and in the exchanges between themselves and the Lords of the Treasury one can see many of the elements, in embryonic form, of the modern UGC system. Thus it was recognized that universities should have some stability in their funding, major changes only occurring at five year intervals; that the University Colleges should provide certain information about what would now be called staff and student load as well as about the revenue received from all other sources; that the Colleges should be visited by distinguished academics who would make some kind of inspection, etc, etc. Having completed its duty the Committee was discharged but other Committees were later appointed at intervals and in the following sixteen years the total government grant for University Colleges rose to £100,000 per annum. By that time its Chairman was Richard Burdon Haldane,[3] a rapidly rising star in the political firmament, about whom more will be written a little later. He was an indefatigable proponent of government financial support for research as well as for the universities and there is little doubt that it was he who persuaded his fellow Committee members to propose that there should be a permanent body to which the government would allocate a sum of money for distribution directly to universities. In 1912 the Treasury handed over exchequer grants to the Board of Education for them to administer

together with grants the Board already made to universities for teacher training. However, this did not mean the abandonment of the Committee or of the principles it was developing.

It was an extremely fortunate circumstance for British Universities that H. A. L. Fisher was appointed President of the Board of Education during the war. He had been a Vice-Chancellor himself and fully understood the financial problems of the civic universities with their relative lack of endowments. It was his determined advocacy which led to the establishment by the Treasury of the University Grants Committee (UGC) in 1919. In retrospect it seems astonishing that the highest official in the land concerned with education should so deliberately detach his Department from the Universities. It is especially interesting that, as we shall see later in this chapter, R. B. Haldane and Christopher Addison were to recommend a similar detachment of certain research activities from Departments to which a superficial observer might think they would naturally belong.

THE UNIVERSITY GRANTS COMMITTEE

A few years ago a medical professor was heard to say in exasperation

> Extracting erythrocytes from granite (i.e. extracting blood from a stone) was mere child's play compared to obtaining funds from the University Grants Committee. It seems to be a mysterious body; and must meet in conditions of great secrecy. I know not when, but probably at dusk.

Ignorance of the Committee and its workings is surprisingly widespread and therefore any opportunity to try and diminish this ignorance is not to be set aside lightly.

There are now twenty-one members of the Committee all appointed by the Secretary of State for Education and Science after consultation with the Secretaries of State for Scotland and Wales. Three-quarters of them are university

staff members, mainly professors, with a small number drawn from industry and other sectors of education. Only the Chairman is full-time; the other members are active in their own professions but are expected to devote about a fifth of their time to the business of the Committee. There are no Vice-Chancellors amongst the membership and if a member is appointed a Vice-Chancellor he resigns from the Committee. Members serve in an individual capacity and not as representatives; but the membership is spread over universities of different kinds (ancient, federal, new civic, old civic, technological, and new universities) in different parts of England, Scotland, and Wales and also across a wide variety of academic disciplines. Appointments are entirely non-political.

In normal circumstances the Committee meets every month except August with occasional extra meetings and it regularly goes on 'visitations' (an unfortunate term redolent of the plague!) which take it to every university in the country in the course of five years. The Committee is supported by specialist sub-committees under the Chairmanship of individual members of the main Committee and these sub-committees also visit universities and give advice to the main Committee on matters concerning the academic or other areas for which they are responsible. The Committee is supported by a very small full-time staff and is not the enormous bureaucratic octopus that many people suppose, nor has it grown at all in the last fifteen years.

The original terms of reference of the Committee were

> To enquire into the financial needs of University Education in the United Kingdom and to advise the Government as to the application of any grants that may be made by Parliament towards meeting them.

They were extended in 1946 by the addition of the following sentence:

> To collect, examine and make available information relating to university education throughout the United Kingdom; and to assist in consultation with the universities and other bodies concerned, the preparation and execution of such plans for the development of the

universities as may from time to time be required in order to ensure that they are fully adequate to national needs.

The Committee thus faces two bodies; the government and the universities and by standing in between them it relieves the government of assuming direct responsibility for universities whilst at the same time safeguarding universities from political interference. The government's responsibility is then to determine the scale of the university system they wish to have in relation to other sectors of education and the general level of support they are prepared to give. The Committee's responsibility is to determine the broad scale of the contribution to be made by each university, to estimate and to provide the resources needed for that contribution, to ensure that there is enough coordination of effort to avoid gaps or wasteful duplication nationally and to give universities advice on national trends and needs, to help them with their own planning. Within this framework the aim is that universities should be free to develop their own ideas.

That is the theory. In practice such arrangements have worked well. Part of their success depends crucially on the quinquennial system and the block grant which is basically a deficiency grant to enable each university to achieve objectives of its own choice submitted to and agreed with the UGC. In normal circumstances, ie. when the quinquennial system is in full operation, the government determines at five yearly intervals the scale of the support it can give, the Committee then calculates the appropriate recurrent grant for each university and the grant is paid monthly as a guaranteed income on which the university can rely throughout the whole quinquennium. The grant is built up from a detailed consideration of each university's needs and commitments in terms of salaries, maintenance, and running costs of all kinds, but once that total is reached by this method the detailed calculations are rubbed out. There is no earmarking of the money except in very exceptional circumstances, for example, in the early stages of development of a new and important activity within a university

such as a medical school or a centre for Japanese studies etc. The university is therefore quite free to allocate this block grant in any way it thinks fit; but in so doing it recognizes that it will not receive further grants from the UGC to eliminate any deficits which it incurs. Equally, the UGC will not remove any surpluses achieved either by prudent husbandry or by private benefaction. There is thus a heavy responsibility on each university fully to manage its own affairs and to develop its own plans, and this responsibility liberates a latent inventiveness and ingenuity amongst all the senior members of the university as well as generating tautness in its economical management.

Of vital importance to the UGC as well as to the universities as a management tool is the Universities Statistical Record now maintained on a computer at Cheltenham and from which can be extracted at very short notice any information required for planning purposes by the UGC or, indeed, by any individual university. Also of great importance to the Committee's understanding of the Universities are the 'visitations' when discussions are held with many 'constituencies' of the particular university including students, academic, and non-academic staff, Senate and Council. These visits are only part of the spectrum of the traffic between the UGC and the universities during the quinquennium. There are also many exchanges by letter and face-to-face between officers of the UGC and their opposite numbers in the universities. The Chairman of the UGC sees Vice-Chancellors frequently both as individuals and collectively at meetings with the Committee of Vice Chancellors and Principals. Moreover letters are constantly issuing from the UGC advising universities of the probable effects on them of pending and actual government legislation, of the significance of reports of Royal Commissions and Committees, and of the deliberations of the UGC's own Committees. These letters may or may not call for a response from the university, but in either event they serve to create within each university a

body of knowledge about national considerations within which they can better assess their own plans.

Between these visits the Committee is busy trying to develop a strategy for the following quinquennium. It studies the probable level of student demand, formulates views about subject areas which require special development (such as medicine), or which may require curtailment because of over-provision or reduced need and has discussions with Government Departments which include not only the Department of Education and Science, which in 1964 replaced the Treasury as the Government Department funding the UGC, but also with other Departments such as the Department of Health and Social Security on matters concerning medical education and the Department of Energy and Industry on the question of education and research in the North Sea oil industry and so on.

About two years before the end of the quinquennium the Committee may send a general note of guidance to universities. The part of that note which is common to all universities gives the Committee's broad view on national trends, student numbers, and other matters. The part specific to each university may give a band of student numbers, subdivided into science-based and arts-based undergraduate and post-graduate categories within which it thinks that university's own target number could lie. A dialogue with each university then ensues which may cause the UGC to modify its original proposal. As a result of these processes each university is then able to formulate realistic proposals for the next quinquennium and to estimate the costs in current prices of new developments which it wishes to pursue. In due course these proposals are formally submitted to the UGC. It cannot be too strongly emphasized that the processes leading to the preparation of a quinquennial submission are of immense benefit to each university, because all sections of each and every university take part in a wide range of discussions involving the stock-taking of the past and the consideration of new directions for the future.

Simultaneously the Committee is involved in a pricing

exercise during which it builds up an estimate of the costs for the whole system it would propose to government and also working on the complicated business of the allocation to be made to each university when the government has made known student number targets it will accept and what money it is prepared to give. This allocation is a complex process involving a blend of judgement and statistical work. At the end of the day the Secretary of State for Education and Science will announce in Parliament the 'university settlement' ie. the sums of money available to the UGC in each year of the quinquennium which is to follow and probably the coarse grain totals of student numbers. With the minimum of delay the UGC then issues to each university its detailed letter of guidance with the block grant indicated for each year of the forthcoming quinquennium.

The success of the arrangement depends firstly upon the effectiveness of the UGC's work ie. how realistic their assessments are of national need or trends in the patterns of school pupil choice, how quickly the universities are likely to be able to react to a particular set of circumstances, and so on. Possibly more important than this to the smooth working of the system is the trust which the universities are prepared to repose in the UGC's judgement which in turn depends upon the way in which they have been made to feel by the UGC that they are genuinely autonomous institutions invited to make a contribution to the university system which harmonizes their own aspirations with national needs.

The preceding paragraphs represent the ideal state of affairs which obtained until 1974. Since then economic crisis has succeeded economic crisis and this has led to the abandonment (except for a brief period) of quinquennial planning. The immense difficulties which these events have created have reinforced rather than diminished the need for a body like the UGC which stands between government and the universities.

INDIVIDUAL UNIVERSITY GOVERNMENT

Although, as has been explained, British universities are not regulated in their actions by any specific university law, they are not immune to the general laws of the land and, for example, they must comply with all the laws which relate to employment, despite the fact that some of their employees, the academic staff, also have a role which is legally specified in the governance of their university. Universities are also subject to control in the way in which they spend public money, a control which is exercised through the Exchequer and Audit Department the head of which, the Comptroller and Auditor General, is responsible to Parliament rather than the Treasury. The Comptroller and Auditor General did not gain access to the detailed financial records of the Universities until 1967. When, about twelve months earlier, it was first proposed that the universities immunity from inspection by the Exchequer and Audit Department should be removed, there were many in universities who opposed this change on the grounds that it would be bound to infringe academic freedom. In the event academic policy decisions which underlie the pattern of expenditure of public money in any particular university have never been questioned. There have, of course, been a few cases in which, the Public Accounts Committee of Parliament, has compelled individual universities to take actions they otherwise might not have done but these generally involved the rectification of past decisions based on expectations that could not be fulfilled e.g. when it had become plain that capital resources had been provided for a university on the basis of a previously estimated target of student numbers which later proved unattainable. It also follows that universities may not sell any property and retain the proceeds or profit to use for other purposes if that property had been purchased with funds supplied through the University Grants Committee unless specific authority to do so has been obtained; though of course they may do so if the original purchases were made with their own money.

Subject to these perfectly normal restrictions in the use of public money the universities still enjoy complete freedom in the allocation of the block grant and their fee income (most of which is derived ultimately from the public purse) and may even use parts of it for quite significant minor capital works. It is pertinent to ask why universities in Britain enjoy this freedom whilst universities similarly supported by the state in Europe and the United States do not. Several causes may be adduced. In the first place there is the fundamental issue of policy which touches on the very nature of universities, namely, that a society needs institutions whose senior members are unfettered in their critical re-examination of the values adhered to by the society and in the advancement of knowledge and, as necessary corollaries, in what they teach the young, how that is taught, the choice of the persons who shall teach, and the selection of those judged fit to benefit from that teaching. If such institutions also need considerable state aid a way must be found to preserve these freedoms and this calls for some relaxation of the normal forms of parliamentary control over government expenditure. The second cause is probably historical. As we have seen, from 1889 to 1930 government expenditure on universities was a very small fraction of total government expenditure and also constituted a minor part of the revenue of individual universities. The detailed ways in which this money was spent made little impact on the mind of the public or politicians who were concerned with more substantial matters. The third factor was undoubtedly the degree of public confidence in the way in which the universities administered themselves and this in turn derived from their particular form of government and especially the involvement in it of lay men and women.

With the exception of the universities of Oxford and Cambridge, which have enjoyed (or suffered from?) many centuries of participatory democracy, all the remaining forty-three universities of the United Kingdom have involved in their government people from many different walks of life. This is laid down either in the Royal Charters

which the majority have or in the Acts of Parliament which govern what the minority may do. Although the terminology differs from university to university the broad pattern is very similar. There is generally a supreme governing body which in many universities is called the Court (not to be confused with the Court in Scottish universities which corresponds more to the Council of English universities) which may be a fairly large body of one or two hundred people some of whom are appointed by representative elements in society e.g. local authorities, trades unions, national learned societies, the body of graduates of the university, local Members of Parliament, Head teachers of secondary schools, persons nominated by other and older universities, and some are co-opted. The guiding principle is that the composition of the Court should reflect the many and varied groups having a legitimate interest in the general purposes of the university and the way it conducts its affairs. This body meets to discuss and decide any major changes in internal legislation of the university, a judgement which must be made in relation to any changes of statute, before approval can be sought from the Privy Council or, where necessary, amending legislation put before Parliament. Such a large body is not suitable for the transaction of more detailed business which is therefore the responsibility of a much smaller body, often called the Council to which some members are elected by the Court, some by the Senate (see below), some co-opted and, in some instances, a few may be appointed by outside bodies. Increasingly since about 1968, universities have appointed a few students to Council.

The Council is regarded as—and often is—the real centre of power. It has ultimate control in all financial matters; it is called upon to ratify all appointments recommended by Senate or, as is often the case in senior appointments, those recommended by joint committees of Senate and Council; it is the formal employer of academic and non-academic staff; it manages all the estates and buildings and determines capital works programmes and, in short, decides all matters not involving questions of research

and teaching, which are generally the prerogative of Senate, and some that do.

There is no lay membership of Senate which is exclusively academic as its name in many Scottish universities, *Senatus Academicus,* signifies. The compositions of Senates have changed much in recent years but in most cases are still quite rightly dominated by the professors who, after all, have been appointed for their academic standing, their distinction, and the leadership which they can give in their subject after a most detailed and careful scrutiny of their and other candidates' records. But nowadays Senate will contain a very considerable proportion of non-professorial staff and some students, though the latter are excluded from certain items of so called 'reserved' business which are principally those relating to matters concerning individual members of staff or students and curricular and research matters. The Chairman of Senate is ex-officio the Vice-Chancellor who is the Principal Academic and Administrative Officer of the University and who is also the fulcrum upon which the delicate balance between Senate and Council is maintained. He has the major role of interpretation of the recommendations of Senate to Council and of the decisions of Council on these recommendations and other matters to Senate. Lay members of Council are often men and women of wide experience fulfilling other important roles locally and often nationally. Collectively they bring to the Council's discussions managerial, business, financial, and sometimes local or national government experience which are of incalculable practical value to the university. The Chairman of Council is always a layman and the Chairmen of important committees of Council such as the Finance Committee, the House and Estates Committee, and the Halls of Residence Committee are almost invariably lay persons. But above all they bring to the judgement on issues a wide knowledge of affairs outside the university which those who spend their lives almost exclusively within universities could not be expected to and rarely do bring in the same measure. For the same reason they are often also very effective representatives

of the university, both regionally and nationally, and they defend the university from unjust or unfounded external criticism.

B. SCIENTIFIC RESEARCH

DEFINITIONS

In chapter 1 science was described as a body of objective knowledge about animate and inanimate matter which human beings constantly strive to bring into a coherent and comprehensive whole by devizing theories which relate effects to precedent causes. Natural science (Naturwissenschaft) is perhaps a better name for this activity. It was also emphasized that this knowledge could be used by man to multiply his own power to reach otherwise unattainable goals. This application of science is the province of the engineer and the technologist. Engineers are people who design processes and equipment for converting one kind of energy into another or into mechanical work or for transforming chemical substances found in Nature into other substances and structures which are needed but which are not present in Nature in sufficiently abundant supply. For the most part engineers use scientific principles and it can confidently be predicted that they will do so increasingly in the future. But they may use empirical knowledge ie. correlations of past and future events which are imperfectly understood. Technologists are those concerned with the best techniques of producing the things we need and they make use of many skills including those of science and engineering.

Governments have a responsibility to use the revenues which they have extracted from the electorate for the benefit of the people. The maintenance of a national competence in engineering and technology is an aim to which governments will naturally give high priority because it is seen as likely to yield economic benefits. In contrast, natural science, though acknowledged as a valuable cultural activity and important in its own right, often does not

command the same priority with governments because the benefits are often unforeseen or long delayed in realization. Such a view is dangerously short-sighted for science, engineering, and technology are in practice inextricably interwoven. Thus many advances in engineering and technology are both prompted and made possible by earlier work in natural science. But those who work as natural scientists cannot foretell the ultimate application to which their work might be put, and the possibility of an application is not a factor which they often consider when they choose their programme of work. This relationship of engineering and technology to natural science is also reciprocal, as present day natural scientists would be the first to acknowledge, because engineers design and technologists manufacture those scientific instruments without which the progress of modern natural science would be gravely retarded.

Many examples can be quoted of this reciprocity. One of singular appeal is that connected with one of Nature's fundamental particles, the electron. It is recorded that at the Annual Dinner of the Cavendish Laboratory at the turn of the century when J. J. Thomson's research had brilliantly established the existence of this elementary particle of matter which has both mass and a negative electric charge, a toast was given in these words 'Here's to the electron! May no-one ever find a use for it!' Now, vast industries and telecommunications as well as devices used at work, at home, and in vehicles depend on what physical research has revealed of its properties. Science too has profited from the exploitation of this knowledge and of theoretical speculation about the nature of the electron. For example, a quarter of a century after J. J. Thomson's work great theoretical developments were taking place in an attempt to unify some of the phenomena of atomic physics and chemistry, a French aristocrat, Louis de Broglie, propounded the idea of wave-particle dualism encapsulated in the simple equation

$$\lambda = h/mV$$

which expresses the idea that a particle of mass m and velocity V will behave as if it were electro-magnetic radiation of wavelength, λ. Solely with a view to testing this proposition G. P. Thomson (the son of J. J. Thomson), Professor of Natural Philosophy in Aberdeen University, constructed an apparatus to accelerate electrons in an electrical field, thereby giving them an energy such that if the equation of de Broglie were true they should behave like soft x-rays and be diffracted by a crystal which was known to diffract x-rays. The result of these experiments provided unambiguous confirmation of the de Broglie equation and G. P. Thomson won a share in the Nobel Prize. Moreover since the resolving power of a microscope depends inversely upon the wavelength of the light which it uses, a microscope employing electronic beams rather than visible light should have a much higher resolving power than optical microscopes and render very much smaller objects 'visible'. Electrical engineers and applied physicists then designed, developed, and brought into production electron microscopes which in the hands of physical and biological scientists alike have enabled an immense amount of new information about the fine structure of living and non-living matter to be obtained.

TENTATIVE STEPS

It has taken many centuries for governments and bureaucrats to appreciate the symbiosis which exists between pure and applied science and indeed there would be some who maintain they do not perceive it clearly even today. It was certainly not understood in the seventeenth and eighteenth centuries. Even science was denigrated by some rulers. Thus Charles II, whilst willing to give the Royal Society its Charter in 1662 (at no cost to himself), was equally ready to upbraid Isaac Newton for engaging in 'childish diversions'. The state first assisted only that science it judged would benefit the nation economically or militarily. It was the expansion of trade in the sixteenth and

seventeenth centuries which focussed attention on navigation, terrestrial magnetism, astronomy, meteorology, and statistics that induced the governments of the Western World to take an interest in and to patronize science for the useful results its application in these spheres was expected to produce. These were the kind of arguments which induced Charles II to found the Royal Observatory, the cost being met by the sale of spoilt gunpowder, and he provided so little financial means that the first Astronomer Royal, John Flamsteed, was forced to buy the equipment he needed out of his own pocket! The same reasoning persuaded Parliament to establish a Board of Longtitude in 1714 and, under pressure from Royal Navy Captains, to offer a prize for a reliable means of ascertaining longtitude at sea. Despite this act it would not be unfair to comment that during the eighteenth century the indifference to science of Oxford and Cambridge was matched only by that of successive Governments.

The early years of the nineteenth century were notable for advances in pure science made mainly outside the English universities by individuals of private means or endowed by a wealthy patron or employed in the Royal Institution as names like Davy, Dalton, and Faraday remind us. Of these Davy was particularly outward looking and saw the implications for the common weal of a more widespread knowledge of chemistry and its applications. To this end he gave lectures on agricultural chemistry which drew large audiences. He also reflected on the Napoleonic Wars, commenting that science gave Britain the power that defeated Napoleon in these words

> During the last war [James Watt's] inventions and their application were among the great means which enabled Britain to display power and resources so infinitely above what might have been expected from the numerical strength of its population.

Yet in 1830, shortly after Davy had written these words Charles Babbage, Lucasian Professor of Mathematics at Cambridge, and the inventor of the first calculating

machine (which was however too difficult for the mechanics of his day to construct) published his *Reflections on the Decline of Science in England*[4] pointing to the fact that the French had learned their lesson from Britain in the recent war and had begun to organize and support science and higher education on a national basis. He predicted that the French nationally organized science must ultimately overtake British individualistic science. He attacked the Royal Society for its inertia and neglecting what he conceived to be its duty of pressing these reforms on the government. Some of the general discontent, especially with the failure of the Royal Society; so pungently articulated by Babbage and also Sir John Herschel, was probably one of the influences which led to the establishment in 1831 of the British Association for the Advancement of Science.[5] Concern about universities was expressed in the same year by Sir William Hamilton of Oxford who pressed for reform of the universities urging that they should become national institutions (a truly revolutionary idea). When the British Association met in Oxford the following year there was a debate on the place of science in the university at which the Savilian Professor of Geometry drew attention to falling attendances at lectures in mathematics, chemistry, and experimental philosophy (physics).

Broadly speaking the first half of the nineteenth century was characterized by government apathy towards science. It did however take two positive steps forward. The first was the creation of the Geological Survey in 1835 but the intention of government was not to have a survey of geological resources in the country for its own sake but in order to safeguard the state's interest in mining royalties. The second was the formation in 1848 of the Inland Revenue Laboratory but again the government's motive was not concern for science but to protect Customs Revenue by detecting adulteration. No wonder that Justus von Liebig, writing to Faraday, after visits to England considered that this country was not a land for science because 'only those works which have a practical tendency awake attention and

command respect, while the purely scientific works, which possess far greater merits, are almost unknown . . . in Germany it is quite the contrary'. Liebig's name is well known to all chemists as that of the creator of the first big school of organic chemistry in Germany. He was in every way a remarkable man. He had his Doctorate by the age of 19. In those days young chemists with enthusiasm and ambition had to go either to Paris or to Stockholm. In 1823 Liebig went to Paris and gave an account to the Academy of Sciences of his work on fulminating silver. Among the audience was the great Alexander von Humboldt, who was so favourably impressed with the young chemist that he introduced him to Gay-Lussac who took the young German into his private laboratory. A year later and armed with Gay-Lussac's strong recommendation, Liebig, at the age of 21, was appointed Professor of Chemistry at the University of Giessen where he established a famous School of Chemistry and his academic progeny filled chairs in many other universities. Liebig's intelligence was not narrowly academic and, though devoted to pure science, he saw very clearly the desirability of the closest possible scientific links between the world of academia and that of industry. In large measure because of Liebig's advocacy and example these connections became more widely pervasive in Germany than in Britain so that, in consequence, both science and industry advanced rapidly in Germany and by the end of the century German exports had exceeded those of the British.

His pessimism about the state of science in Britain did not deprive Liebig of power to influence its course. His visit to England in 1842 was partly responsible for the establishment of the Royal College of Science to which, A. W. Hofmann was appointed as first Professor of Chemistry on the recommendation of Liebig. It was in this institution that W. H. Perkin, Senior, was later to synthesize indigo which could have been the basis of a very successful British dyestuffs industry. In fact because of the inferior position of science in British industry the opportunity to create a strong organic chemical industry based upon dyestuffs was seized

not by Britain but by Germany, a fact which Britain had cause to regret when the First World War erupted in 1914.

It is fair to regard the mid-point of the nineteenth century as a turning point for government interest in science. Prompted in part by the interest of the Prince Consort, himself of German origin, the authorities decided to have a Great Exhibition which would illustrate the material progress already made by human beings and establish the point in the public mind that further progress depended upon the advancement and application of science. At the Prince Consort's suggestion Lyon Playfair visited the Continent of Europe to study technical education and returned to launch a campaign underlining this point and also to emphasize that the lack of contact and co-operation between practical and scientific men was harmful and that their collaboration and mutual support would be highly beneficial. Matters moved relatively rapidly thereafter. The Royal College of Science, The Royal School of Mines, and the City and Guilds College were developed on the South Kensington site. The government set up agencies of its own to carry out particular functions, like the Meteorological Office founded by the Board of Trade in 1854, but most of these acts were piecemeal and could not be described as a consistent policy for either pure or applied science. The arbitrary way in which government allocated money to various scientific enterprises was brought to public attention by Colonel Alexander Strange in 1870. He argued for the creation of state science laboratories, for a Science Museum, for public help to the universities and his pressure resulted in the establishment of the Devonshire Commission[6] two years later. The Commission's recommendations, although making excellent sense, were ahead of their time. The public and the government were not ready to accept the idea of research grants for private scientists, the creation of a Ministry of Science and Education (*sic*), the establishment of state laboratories, and the radical reform of secondary education. So the only positive outcome was a government

grant of £4000 to the Royal Society to allocate funds to meritorious research projects.

THE RESEARCH COUNCIL IDEA

At the time the Devonshire Committee reported a young Edinburgh graduate, Richard Burdon Haldane,[3] was studying philosophy in Göttingen whither he had been sent by his canny Scots father to avoid acquiring the idle habits of the Oxonian. Whilst there he became interested in German organization for science and on his return to England he became a lawyer and entered politics but continued his interest in science so that, when the South African war revealed serious deficiencies in British weapons, Haldane, the politician, was drawn into the problem of the use of science by government. In 1905 he was appointed Secretary of State for War and reorganized the army. In doing this he found that he needed to organize government research for the development of new scientific weapons, especially aircraft. This was the first British organization of government scientific research in the modern manner. Haldane was a truly remarkable man, understanding science though not a scientist, liberal in all his instincts, but held office in both Liberal and Labour Governments, a powerful advocate for the cause of higher education. He has appeared earlier in these pages as Chairman of one of the precursors of the University Grants Committee where his impact was considerable. In the area of science and government he proved to be the right man in the right job at the right time showing a very clear perception of what the relationship should be.

During the early part of the twentieth century the government continued to deal with science on an *ad hoc* basis and without creating any radically new structures. Thus, whilst accepting the arguments that some national laboratory like the Reichanstalt's Institutions was necessary and creating the National Physical Laboratory in 1902, they promptly handed it over to the Royal Society to administer;

in 1909 they appointed an Advisory Committee for Aeronautics and in the same year created the Development Commission aimed at developing agriculture, rural industries, and fisheries and this Commission spent most of its money on agricultural research and education and the assistance of grant-aided research stations.

In 1913 a Medical Research Committee was created about which more will be written in chapter 3. As the First World War developed it became clear that it was not, as many had thought, going to end quickly and that the armed services and the industries which supported them would need scientific help. A Committee of the Privy Council chaired by the Lord President was set up in 1915 'to develop and organize the knowledge required for industry, to keep in touch with other Departments concerned with science research, to undertake research on behalf of other Departments and to stimulate the supply of research workers'. The following year the Department of Scientific and Industrial Research (DSIR) was formed as the Committee's executive instrument. To assist the Lord President in developing the work and policies of the Committee and DSIR he appointed eminent scientists to a special Advisory Council. These were all steps in the right direction but did not result in any coherent philosophy of the interdigitation of science and government which could serve as a guide to policy and action in the future. That came as one of the by-products of the Report issued in 1918 by a Committee on the Machinery of Government presided over by Haldane.[7] This Committee classified the business of government into a number of categories which included that of *Research and Information,* and its discussion of this item led it to enunciate an explicit statement about the organization of government research which was even more profound than was appreciated at the time. With remarkable prescience a distinction was drawn between the research and development necessary for a department of government to discharge its own functions, which the Committee considered should be 'supervized' by the Department and

'research work for general use' which it considered could be best administered by research councils independently of Government Departments and therefore free from immediate political or administrative pressures. It gave force to this policy by a specific recommendation that if, as was expected, a Ministry of Health should be set up then the Medical Research Council (which the Medical Research Committee had become) should be reconstituted but under a Privy Council Committee after the pattern of the DSIR, rather than under the control of a Ministry of Health.

This report gave the seal of approval to the Research Council idea. In the 40 year period before this concept came up for further scrutiny both DSIR and MRC played notable parts in the development of British science and its application to particular problems. Their success made the decision to create an Agricultural Research Council in 1931, both logical and widely acceptable.

CONSOLIDATION

The growth of these three Research Councils was not an obstacle to the development by individual Government Departments of research facilities for their own use. Indeed, it could be argued that the reverse was true because the Haldane Committee clearly saw the necessity for this and the Research Councils had demonstrated the power of research to solve problems. Some Government Departments established their own Directorates of Scientific Research, a change which gained impetus during the second World War. After that war there was a general conviction that science must continue to receive strong government support and that for maximum benefit to be derived from science an awareness of its powers—and limits—should permeate all Government Departments. The esteem in which science was held by government reached a peak at the beginning of the 1960s when the growth-rate of the science vote reached its highest level and in Quintin Hogg (Lord Hailsham) science and technology had a Minister of Cabinet rank

assisted by an Advisory Council on Science Policy throughout the period 1959 to 1964. But by the end of the 1950s certain strains were evident and questions were raised as to whether the industrial Research Associations, which were partly funded by DSIR, still performed a useful function, whether the Privy Council should continue to be responsible for the Research Councils and whether higher education and research ought to be brought into closer relationship with one another.

To examine these and kindred questions the Trend Committee was formed. When it reported in 1963[8] it reaffirmed the Haldane principles and applied them to DSIR recommending allocating research for general use to the new Science Research Council which it recommended should be established, whilst responsibilities for industrial Research Associations should be detached and incorporated elsewhere in the government machine. The same Committee also recommended the establishment of a new Research Council, the Natural Resources Research Council, but stated that there should be no major change in the functions of the MRC or the ARC. It also proposed a body to replace the Advisory Council for Science Policy to advise the Minister for Science. Two years later a new government differing from that which had set up the Trend Committee came to power. It passed the Science and Technology Act[9] which embodied most of the Trend recommendations. Thus the ARC, MRC, and two new Research Councils (Science, carved out of DSIR, and a freshly formed Natural Environment Research Council) were brought under the jurisdiction of the Secretary of State for Education and Science but also given the protection of Royal Charters. To advise the Secretary of State on policy and on the allocation of resources to these research councils and the Royal Societies of London and Edinburgh a Council on Scientific Policy (CSP) came into being. This body also became responsible for the British Museum (Natural History) and six years later for the funding of the Social Science Research Council which had been established under the Science and

Technology Act as a result of the recommendations of the Heyworth Committee's Report.[10] No Arts and Humanities Research Council was ever established for the reasons given in the note.[11]

The new Labour Government took up office with a marked commitment to science and technology which found verbal expression in the phrase 'the white-hot technological revolution'. A Ministry of Technology was formed which agonized over issues such as technology transfer, what to do with the Research Associations for which under the Science and Technology Act of 1965 it had become responsible and how that scientific expertise and the material resources of the Atomic Energy Research Establishment at Harwell which were no longer needed for strictly atomic energy research could be deployed to the advantage of technological industry generally. Scientists were brought into Government not merely as advisers like Professor (later Lord) Blackett who became Chief Adviser to the Minister of Technology but also as Ministers in their own right. The latter included Lord Snow, novelist and former physical chemist, and Lord Bowden, physicist and Principal of the University of Manchester Institute of Science and Technology. As if recognizing that even these arrangements did not provide a sufficiently close articulation of science with government, the Prime Minister appointed a Chief Scientific Adviser to the Government, Sir Solly (later Lord) Zuckerman, whose office was located at the centre of power i.e. in the Cabinet Offices. He was advised by a Central Advisory Council on Science and Technology comprised of scientists in government, private, and nationalized industries; industrialists who were non-scientists; an economist, and a trade-union leader amongst others.

Despite ominous economic signs of low industrial productivity and increasing inflation, nothing seemed to shake a general euphoria based on an unquestioned belief that money spent on science and education must represent wise investment which would yield economic dividends. So in 1965 the Science Vote enjoyed an annual growth-rate in

real terms which exceeded 10 per cent and, although in subsequent years that growth-rate declined, it remained positive throughout the 1960s. Nor was there any slackening of growth on the university side. The UGC continued to provide capital and recurrent resources for more students, especially in science, engineering, technology, and medicine.

What actually happened in the succeeding years fell far short of expectations and created a mood of disillusionment. Some of the subsequent events were foreseeable. For example a careful look at the proportion of sixth-form students in schools in England and Wales who were studying mathematics and science showed a decline of 1 per cent per annum from 1959 onwards.[12] This trend, if maintained, (and there were no signs of its slackening) combined with the shrinking size of the 18 year-old age group in the early 1960s meant, that as surely as night follows day, there would be progressively fewer applicants of the right quality and less than there were places to receive them in higher education. This was especially true in engineering and technology and at the postgraduate level. Consequently universities, anxious to maintain their target numbers agreed with the UGC, admitted large numbers of overseas students to these Faculties. The position in the polytechnics was even worse. They experienced a famine of science applicants and a glut of applicants in law and social studies and, in responding to this situation, they departed significantly from the purposes they were set up to serve. Concern was expressed over the graduates in science, engineering, and technology who were produced. Reports were generated on questions of their ultimate destination in employment (the 'brain drain')[13] and whether the forms of postgraduate studies which the universities and polytechnics offered fitted or unfitted these students for industrial employment.[14] Disenchantment with science grew in the minds of students and politicians alike but for different reasons. Some students felt that science and technology were the instruments of a repressive society, the slaves of the

military industrial complex, whilst in Westminster and Whitehall the view was growing that scientists had never had it so good and that, since there was little evidence that they had delivered the goods, the time had come to call the party over for scientists[15] and to rethink the relationship between science and government.

RECONSIDERATION

The first positive step in this direction was taken in Whitehall rather than Westminster with the establishment of a Committee of Officials at which certain discontents about the performance of the Agricultural Research Council had been expressed by officials in the Ministry of Agriculture, Food and Fisheries. The Council for Science Policy, alarmed by this development and also feeling that five years after the passage of the Science and Technology Act it would be right to review the arrangements for the Research Councils, decided in 1970 to set up a Committee for this purpose. To do so clearly required the approval of the Secretary of State but before that could be obtained there was an election and a new government came into office in June 1970.

The new Secretary of State (Mrs Margaret Thatcher) agreed to the establishment of the CSP Committee which began its work in the autumn of that year. Meanwhile the new Prime Minister, Mr Edward Heath, was anxious to have at the centre of the government machine a 'think-tank' to which difficult issues often transcending departmental boundaries could be put and which could also proffer advice on matters of its own choice. After some delay the Central Policy Review Staff was set up and Lord Rothschild was appointed as its Chairman. He chose for the first piece of work an examination of government research and development.

The outcome is perhaps too recent for an expression of view with proper historical perspective but a number of points may be made which future historians are unlikely to

falsify. The CSP Report[16] was completed in 1971 and available to Lord Rothschild whilst he was compiling his.[17] Whilst reaffirming the Haldane principles it went further in reclassifying government scientific research for operational and therefore funding purposes. These categories were *basic, strategic,* and *tactical.* Basic and tactical were thought to be at extreme ends of the spectrum. The former is what other people would recognize as pure research, curiosity-oriented, or self-chosen to use the jargon of the sociologists of science and represents that kind of work which is undertaken with no practical objective in view but merely because the investigators think that there is a good possibility of advancing knowledge. The natural home of this work is the universities. Since no-one knows what economic benefits will follow it is difficult to decide the amount of money which should be allocated to this kind of work but once that decision has been made the distribution of that sum amongst researchers can be easily made through the peer review mechanism, a method which has its drawbacks but which has not been superceded and is therefore acceptable both to government and to the recipients of the money. At the other end of the scale there is *tactical* work defined as that work for which it is known that the objectives can be attained in a reasonably short space of time by means either of the application of existing knowledge or of the acquisition of new knowledge by established methods. Here the driving force for the work is not the investigator but the person who wants the results, is prepared to pay for them, and was called by Rothschild the 'customer'. Government Departments with clear objectives of this kind and with money to pay for research then draw up their priorities of work and go out into the market place to find the best contractor, who may be in-house, in a Research Council, a University, or industry.

Programmes of basic and tactical research are, in principle, easy to choose and manage. The investigator(s) and Research Councils perform these functions for basic research; Government Departments for tactical research.

The position is less clear-cut with *strategic* work, defined as research in a broad area undertaken not because what is proposed is either of high merit and likely to increase significantly the understanding of some fundamental aspect of science or can lead quickly to a needed practical outcome but because a judgement has been made that work in this field is likely to generate knowledge which could be useful though the precise practical utility cannot be predicted at the time the decision whether to start the work has to be taken. Medical research abounds in examples of strategic research. At their inception, in the 1930s and 1940s, respectively, of the MRC's Cambridge laboratories in Applied Psychology and Molecular Biology the practical benefits that would emerge from these could have been glimpsed dimly if at all. Those decisions were taken by people who concluded that in each field there were people of high quality able to carry out successfully technically difficult work and that each field was concerned with matters so central to the physical health of human beings and their capacity to perform mental or physical tasks that useful knowledge which could be applied to the amelioration of the human conditions was bound to emerge. Events have amply vindicated those judgements. Improvements of intelligence testing, workshop layout, aptitude testing for skills, penal treatment, etc. have flowed from the applied psychology work and the present reality of and future potential of 'molecular medicine' provide an overwhelming justification for the MRC's investment in molecular biology. Yet these consequences were unforseeable when the critical decisions were taken. It is, to say the least, highly unlikely that Government Departments such as those of Education, Industry, Home Office, Defence, and Health would have had the scientific knowledge to see the possible opportunities and likely that their budgetary and accounting procedures would have precluded their initial funding and sustained support of such speculative ventures. Decisions of this kind emerge from discussions in a forum where outstanding, imaginative scientists who are well-placed to

know what is scientifically likely to be feasible mingle with and have to convince other thoughtful people of differing backgrounds and preoccupations that in the end this or that speculative research may yield benefits outweighing in importance the smaller incremental advances gained by tackling more immediate issues. The best forum so far devised is a Research Council and that is why it must have the resources to enable it to implement programmes of strategic research.

Considerations like these led the CSP to state that the support of basic research in all its aspects (financing of laboratories for fundamental science and engineering, grants to individuals or teams of investigators, post-graduate research training awards) and of the bulk of strategic research should remain the province of the Research Councils which however should not shrink from expanding the amount of work they undertook from Government Departments on a repayment basis. They also recommended a broadening of membership to enrich the experience available to the Research Councils and a strengthening of operational links with other sectors of government. For similar reasons the CSP argued for changes in its own membership bringing in the heads of the research councils and the UGC as full members together with Chief Scientists of key government departments such as Industry, Defence and Environment.

Rothschild took a different view on a number of points. He was not attracted by the CSP classification of scientific work and at a deeper level was sceptical about the CSP's opinion that scientists like to see a practical outcome to their work and when that is in prospect they are often strongly motivated to follow it through energetically to the finish. He felt that applied work would never be performed with the vigour necessary to achieve a result which would satisfy the departmental user unless money changed hands. Forcing the scientist to 'earn his keep' was the only discipline which would ensure value for the public money expended. There were two corollaries of this view, elevated by its author into

a 'customer-contractor *principle*'. The first, with which the CSP strongly agreed, was that Government Departments should be better able to identify their own needs for scientific work and for this each should have a proper Chief Scientist Organization with the resources and status which made science more influential in their own department and enabled them to purchase whatever scientific work they had identified as necessary. The second arose from his personal judgement that some Research Councils were, inappropriately, using their own funds to carry out applied work which he thought Departments should have initiated and paid for and, therefore, decide when to terminate. The logic of this led Rothschild to recommend the transfer of substantial funds from ARC, NERC, and MRC to various Departments to deploy as they thought fit. Surprisingly, in view of its commitments to engineering and technology, the SRC emerged unscathed from Rothschild's scrutiny.

In the end government decided[18] and, as so often is the case, each protagonist got something but neither as much as it sought. Less money was transferred from the Research Councils than Rothschild originally proposed, the CSPs proposals for reform of itself were accepted and it became the Advisory Board for the Research Councils (ABRC), and Departments were expected to set up Chief Scientist Organizations as proposed by Rothschild. Were these changes beneficial reforms or unproductive dislocations? It is impossible to tell simply because in the subsequent decade other factors affected science more than these changes. The most important factor was the declining state of the economy of the country which meant that the growth rate of the science vote decreased throughout the 70s and became negative, as did the unit of resource of the UGC. Nevertheless three observations can be made the validity of which is unlikely to be questioned by historians. The first is that bureaucracy and paperwork increased. The second is that if the DHSS were to use wisely the funds it had received by transfer from the MRC then the newly appointed Chief Scientist had to advise Ministers how it should be spent. If

in his judgement the use made of it by the MRC before transfer was consonant with Departmental needs and policies then this conclusion called into question the validity of the arguments for transfer. If he judged it did not harmonize with DHSS policy then he required a mechanism for allocating it accordingly which would require a research procurement board showing a marked resemblance to the MRC. The absurdity of the bureaucratic duplication inherent in the latter course and the growing conviction that the MRC was giving due weight to the Health Departments' needs for research caused government to return to the MRC the money which had been removed from it nine years earlier. Thirdly, it is questionable whether the Chief Scientist Organizations have been sufficiently effective within their departments. Where they have not it can be attributed either to a combination of the resistance of Civil Servants to the intrusion of Chief Scientists into their domain of decision-making and the inability or irresolution of the Chief Scientists in making this penetration or perhaps even to a general incomprehension in the Civil Service of the nature of science and its possible roles in the administrative processes of government which may not be unrelated to the kind of education which most Civil Servants had received and which left them in a state of scientific and therefore cultural deprivation. Finally it should be added that even in the Government's view these arrangements could not have been regarded as entirely satisfactory because some three years later the Advisory Council for Applied Research and Development (ACARD) was established and has already won for itself a good reputation as filling a necessary gap in government machinery. Part of its success derives from the fact that there is some cross membership with the ABRC, which has facilitated the work of both bodies.

An interesting and intriguing pendant to this debate of the early 1970s is that when Lord Zuckerman retired from the post of Chief Scientific Adviser, he was succeeded briefly by Sir Alan Cottrell, but the Government then allowed this

post and the Central Advisory Committee on Science and Technology to lapse, a rather less brutal extinction than that afforded in the USA by President Nixon to his science supremo, Ed David, and the President's Scientific Advisory Committee. For several years both countries have been without any scientific committee and chief scientific advisor at the centre of the government other than in Britain where a scientist of rather lower rank is a member of the Central Policy Review Staff. The United States has recently reinstituted its post of Chief Presidential Science Adviser though with revised terms of reference but, so far, Mrs Thatcher's Government seems content with the present arrangements. It may not be without significance that these changes, which cannot have enhanced the status of science in national affairs, have excited little interest or controversy. Possibly both sides feel that arguments about organization are less important than was once thought or that worldwide economic recession has obtruded weightier preoccupations.

At the beginning of this chapter a comment was made that the British Government during the nineteenth century did not have a coherent policy towards scientific research and development but met problems as they arose. Science is now firmly and irreversibly embedded in the government machine but it seems unlikely that the precise organizational form will remain forever as it is now and it is quite certain that government will go on creating specific *ad hoc* bodies to deal with problems and later fit these new bodies into the general machinery of government. There are many examples of this in the 1970s when questions of supply and utilization of energy became so prominent, and it therefore became necessary to establish a committee of Chief Scientists on energy research and development: when the possibilities offered by recombinant-DNA work required exploitation so a working party on Biotechnology was established and because of the risks of this kind of research a Genetic Manipulation Advisory Group was set up to regulate experimentation in this area. Other problems loom

on the horizon which may well merit similar handling and one might reflect that the sequence; recognition of a problem, taking *ad hoc* measures to deal with it, reconsideration in the light of some years experience followed by reorganization is merely part of the natural evolution of the machinery of government and it had therefore better be accepted as a permanent feature of our society.

Where does medicine fit into the British pattern of teaching and research which has been described in this chapter? Is it a science or a technology, a combination of both or neither? How should it be accommodated in the higher educational system? How should a policy for medical research be determined? These are questions which cannot be fully answered without some more detailed knowledge of the present place of medical education in the universities and of the present organization of medical research and the history of their recent development. These are issues addressed in the next chapter.

3

Medical education and research

THE GENERAL SCENE

The universities hold a monopoly of undergraduate medical education but not of postgraduate and continuing education. The holder of bachelor's degrees in medicine and surgery may, but rarely does, opt to pursue further full- or part-time research leading to a higher degree such as MSc or PhD though many proceed to the MD. In this case his progress will be regulated entirely by the ordinances laid down by the university for the work to be done and the examinations to be passed before the higher degree can be awarded; but some research, and particularly in the case of the MD degree, much of it may be executed *pari passu* with the doctor's own medical employment or practice. Many doctors will seek other postgraduate qualifications such as the various levels of membership of the Royal Colleges or Faculties, relevant to their chosen specialty, which set the conditions to be met by candidates. These conditions include specified periods working as an 'apprentice' under the supervision of approved persons as well as prolonged study of specified subjects and the passing of prescribed examinations. The supervisors are often consultants in the National Health Service and the apprentice is then employed in one of the 'training grades' of that service. In the case of general practice the supervising General Practitioner is, in fact, known as the 'trainer'. Whatever his career objective, if he is not going to be a full-time researcher, the doctor-in-training is likely to be subject to a major university influence only if he works in a teaching hospital or his trainer is part of a university practice.

Notes and references begin on p. 162.

At the undergraduate level the responsibility for education lies with the universities, with the National Health Service providing some of the facilities for the clinical part of that education. At the postgraduate educational level, as well as National Health Service consultants, full-time academic staff holding honorary consultant posts with the National Health Service may supervise the training of young doctors who aspire to non-university higher qualifications. The prosecution of pre-clinical medical *research* is predominantly a university activity whilst clinical research is undertaken by whole-time academic staff and to a lesser degree by NHS consultants. In many cases the resources which either the university or the National Health Service can put at the disposal of the researcher need to be supplemented by additional funds. The main providers of these funds are the Medical Research Council and the numerous medical charities. In this chapter the way in which universities acquired their monopolistic role in undergraduate education and how the Medical Research Council evolved will be described, not just because they are interesting sidelights on British social and political history germane to the central theme of this book, but also because they speak to the important issue of how individuals exercising an independent professional responsibility as teacher, doctor, researcher or some combination of those can do so when the state is the paymaster.

THE HISTORY OF BRITISH UNDERGRADUATE MEDICAL EDUCATION UP TO 1950: TYPICALLY ILLUSTRATED BY SHEFFIELD

Degrees in medicine were amongst the earliest to be offered by the four ancient Scottish universities and Oxford and Cambridge. In the two latter, however, it was not possible to proceed to studies in medicine until the Master of Arts degree had been obtained and the period of study thereafter was quite protracted. In Oxford, for example, a Master of Arts was precluded from supplicating for a Bachelor's

degree in Divinity, Medicine, or Civil Law until seven years had elapsed after becoming an MA and a further four years of study was required before he could submit for a Doctor's degree in these Faculties. The lack of a Bachelor's or Doctor's degree in medicine was no handicap to practising medicine and surgery since the licences to do so were granted independently of the universities. Unlike Scotland, the universities of Oxford and Cambridge could never produce for England enough doctors and the extra ones needed were educated through the apprenticeship system in hospitals, several of which developed their own medical schools. Some of these hospitals were of considerable antiquity; for example, St Bartholomew's Hospital, London was founded by a monk in 1123 and established its own medical school in 1662. Others were of later creation in the seventeenth, eighteenth, and especially the early nineteenth century. Pupil doctors educated under this sytem were generally examined by the Colleges of Surgery or Medicine in London, Edinburgh, and Glasgow, after which they could practice. These arrangements might have been described as chaotic in so far as they related to England and Wales. Order began to be introduced in 1815 with the passage of an Act of Parliament authorizing the Society of Apothecaries to hold examinations and to grant licences to practice. This made available a general medical qualification for those wishing to enter the medical profession who lived in the English provinces and between 1820 and 1840 numerous medical schools were started in London and provincial towns. All were independent except King's College and University College Hospital Medical Schools which, as their names suggest, were from the outset associated with multi-faculty institutions. The establishment of the provincial schools is of particular interest because they frequently antedated the foundation of the university college and those that survived amalgamated with the college and were often a powerful influence assisting the transformation of the college into a university. This did not mean that they lost their identity. On the contrary, although legally incorpo-

rated into and owned by the university, many medical schools for many years maintained a certain aloofness from the remainder of the university which they regarded as the junior member of the partnership. Even now there is a residual but quite detectable tendency of the clinicians to distance themselves from other parts of the university. It is doubtful whether this attitude will ever completely disappear because the clinicians have a dual responsibility; an academic duty owed to the university and its purposes and a responsibility to the National Health Service for patient care, a duty which makes the focus and locus of the academic clinician's major daily preoccupations lie within that Service's hospital rather than his university.

The history of medical education in Sheffield is typical of many provincial centres. In the eighteenth and early nineteenth century many Sheffield medical practitioners took pupils and one of these, Mr Hall Overend, assisted by his surgeon son, began to collect anatomical material and he built a museum close to his house to accommodate the specimens and provide a place for teaching. One may speculate that this purely private venture stimulated other practitioners and also the public conscience for in February 1828 a public meeting was held in the Cutlers Hall which aimed to establish the Sheffield Medical Institution, the foundation stone of which was laid some five months later. The man who proposed the main resolution was Dr A. J. (later Sir Arnold) Knight, a man of a very progressive temperament which led him to be active in many of the movements for higher education which were contributory forces towards the development of the civic universities. Thus he was the founder of the Medical Book Society in 1816, a founding member and first President of the Sheffield Literary and Philosophical Society, a founding member of the Sheffield Public Dispensary (which later became the Sheffield Royal Hospital) and of the Mechanics Institute. Many local practitioners subscribed to the appeal for money, as did some noble local land owners and Members of Parliament, but, regrettably, very few of the

local citizens. Nevertheless, the Institution was open on the 2 July 1829. Mr Overend, who had initially been enthusiastic about this project must have had second thoughts because he then established a rival 'School of Anatomy and Medicine' and for six years Sheffield had two competing medical schools until, in January 1835, Mr Overend's school was looted by a mob which, hearing the cries of distress uttered by the wife of the drunken caretaker with whom she had quarrelled, invaded and set fire to the building under the impression that someone was being murdered to provide a corpse for dissection. The Sheffield Medical Institution survived and in due course established a proper governing body which prescribed the subjects to be taught, appointed the teachers and levied tuition fees. But the old tradition was preserved, in that each student was apprenticed to a General Practitioner and owed him duties as an unqualified assistant. The teachers were unpaid and had to take time for preparation and lecturing from what was left after discharging the duties of a sometimes busy practice. As Dr A. W. Chapman has written[1] 'his (i.e. the medical practitioner-teacher's) rewards were the refreshment of his mind in keeping up-to-date, the consciousness of making a contribution to the community and, perhaps the prospect of consultations likely to be sought by his pupils when in due course they became qualified practitioners'. It was not until 1850 that a full-time Medical Tutor was appointed and a further 18 years had to elapse before the school dignified itself with the title 'The Sheffield School of Medicine'.

By the middle of the nineteenth century the school was in a sorry state; finances were precarious, it had difficulty in securing an adequate supply of bodies for dissection, and those who gave instruction were constantly changing so that continuity of educational policy was difficult, if not impossible. The curriculum was largely determined by the subjects required by the Society of Apothecaries in their examinations. The teaching was highly didactic, consisting largely of formal lectures with practical classes only in

dissection and the student learnt the practice of clinical medicine by watching others and by routine duties as an apprentice. Sheffield was not alone in this, the profession itself was in some disarray over education and certification for, as Professor F. G. Young has recorded,[2]

> there were 19 separate Licensing Bodies which could confer professional titles after tests widely different in character. Most of the titles had a purely local value, with the result, for example, that an Edinburgh practitioner might be unable to extend his practice legally to London or even Glasgow, while a graduate of the University of London was legally prohibited on pain of prosecution by the Royal College of Surgeons from practising as a physician in London.

Parliamentary concern for this state of affairs led to the passage of the Medical Act of 1858 which set up the 'General Council of Medical Education and Registration of the United Kingdom' which removed some of these anomalies. From its inception the General Medical Council, as it is now known, has been a force for progresss in medical education and, by using its power to grant to or withhold approval from proposed curricula in medicine, the observations it has passed on the particular medical schools and the reports which it has issued on specific aspects of medicine it has consistently promoted high and uniform standards.

The Sheffield Medical School must have felt under some pressure from the General Medical Council to change but the records of the next twenty years do not show that the School had either the ability or any great willingness to respond. Another relevant factor contributing to more progressive attitudes to all education, was the rapid development of the natural sciences and engineering, particularly in the third quarter of the nineteenth century, which, as recorded earlier, together with the need for better trained people in manufacturing industry was influential in creating the demand for more higher education. Science also began to affect medicine. For instance, Pasteur had moved on from his chemical and fermentation studies to found a germ theory of disease and had strikingly illustrated its utility in relation to anthrax. Under the impact of

advancing scientific knowledge the medical curriculum had to become more extensive and scientific and this required a greater expense both on lectures and on equipment. By 1882, when the Royal Commission on the Medical Acts reported, it is doubtful whether the Sheffield Medical School could have continued without some help in science from some other quarter. Fortunately the Medical School had as its secretary at that time a man of great energy named Arthur Jackson, who was determined that the School should survive and, when in 1882 the lecturer in chemistry at the School, who was also the public analyst, retired, Jackson persuaded the Council of the School to send students to the chemistry courses at the recently established Firth College, to which reference was made in chapter 1. This led naturally to meetings of representatives of the two institutions and the establishment of a joint committee which recommended unanimously in favour of some association of the School and the College but that a necessary preliminary to this was a new building for the School. The arguments adduced by the Mayor and the Master Cutler in their appeal in 1883 for funds for this new Medical School building are of special interest in that they resemble strikingly the arguments employed in the 1960s for the establishment of medical schools in Nottingham, Leicester and Southampton. They wrote:

> A school of medicine is of advantage to them (the people of Sheffield); because it stimulates the members of the Medical Profession to keep pace with the rapid progress of Medicine and surgery; because it educates those who are to take care of the public health in the future; and because it assists, by its students, in maintaining the efficiency of the excellent hospitals generously provided by the public.

A new building for the Medical School was erected immediately opposite Firth College and opened in 1882. It produced an immediate improvement in the School's accommodation and also in its fortune. In particular it enabled the School and the College to recruit new and able members of staff including, in 1894, Christopher Addison.[3] Another favourable factor may have been the fact that in the

following year the efforts of, amongst others, Hicks the Principal of Firth College, that institution received its first government grant (see chapter 2).

This association led to complete fusion of the two institutions in 1897 when the University College of Sheffield was granted its Royal Charter. The Medical School entered this union in an incomparably better a state than it had been fifteen years earlier. It had a new building and its finances were in sufficiently good order to provide a regular income for the pathological museum and prizes for outstanding students and it received a gift from the widow of Arthur Jackson (who had died two years earlier) which, with other funds, enabled it to establish a Chair of Anatomy to which the Medical Tutor, Christopher Addison (later the Right Honourable Viscount Addison of Stallingborough and Minister of Health) was appointed.[4] Eight years later the new College became the University of Sheffield and also entered into new buildings, a large part of which formed commodious premises for the Faculty of Medicine.

For many years the Faculty and the University saw their main roles in medical education as being primarily at the pre-clinical level, the subjects of which were to be taught by professors and lecturers who were full-time members of the University staff. When the students proceeded to clinical work their teachers were, with one notable exception to be mentioned later, the honorary physicians and surgeons of the voluntary hospitals who held unpaid Professorships in the University and derived their professional incomes from private practice. This was in marked contrast to arrangements for clinical teaching on the continent in Europe and in North America where much of that teaching was in the hands of full-time salaried Professors and their assistants appointed by the universities and who devoted nearly all their time to teaching, research and the treatment of patients in the hospitals. To the external observer this arrangement would seem to have obvious advantages over that which prevailed in Britain, but most of the medical profession were content with and even complacent about,

the existing arrangements as the following incident illustrates. A Commission had been appointed in 1910 to enquire into the working of the University of London and the facilities for advanced education and research in the metropolis.[5] Its Chairman was the redoubtable R. B. Haldane who remarked to one of the witnesses questioned by the Commission, the distinguished American, Dr Abraham Flexner, that he had decided not to consider the field of medical education 'because we have been informed that medical education in Great Britain is the best in the world'. This attracted the riposte 'By whom?'. Haldane did not know but asked Flexner if he agreed with the proposition. Flexner, whose own report based on his extensive travels in many countries studying medical education was to change the direction of American medicine, certainly did *not* agree. He was invited to submit a memorandum to the Haldane Commission. In his submission, Flexner observed that clinical teaching should not remain a mere incident in a busy consultant's life but should be properly organized under a full-time Professor. At the time when the Haldane Commission was about to report Sir William Osler, Regius Professor of Medicine at Oxford, addressed the annual Sheffield University Court dinner and the records show[2] that he suggested that the University should appoint teachers of medicine paid to spend their time in the investigation of disease, the care of the patient, and the teaching of students. Such a man, he said 'will have the control of 100 beds, a group of assistants graded under him, all equipment necessary for research and diagnosis and, lastly, a university budget'. He went on 'that is an idea that is in the air (no doubt a reference to Flexner and Haldane), it is coming and there is no reason whatever that in the younger universities, which are less troubled by tradition, these changes should not take place earlier than in the older institutions'.

The idea suddenly caught on in Sheffield. It was powerfully promoted by two remarkable men, (Sir) Arthur Hall, who occupied successively Chairs in Physiology,

Pathology and Medicine and J. B. Leathes, a former colleague of H. A. L. Fisher at New College, Oxford, and whom the latter, as Vice-Chancellor, had enticed back from Toronto in 1914 as Professor of Physiology in Sheffield. They had little difficulty in persuading their colleagues that the University should approach the government to provide at least two-thirds of the stipend of a Professor of Pharmacology. An approach was made by the Vice-Chancellor to the government through the University Grants Committee in the first year of its existence and part of his argument was that this would be an excellent opportunity for the Professor to hold an appointment as a physician on the staff of one of the City's hospitals 'providing in this way the means, upon which the University lays great stress, of teaching pharmacology not merely as an abstract science but in its clinical application'. The UGC complied with this request and Edward Mellanby[6] was appointed to the Chair and also became an honorary physician to the Royal Infirmary. However, full-time clinical departments of this sort are expensive and in Sheffield the Department of Pharmacology remained unique until 1946, though two years earlier the University had looked forward to the creation of others like it. This did not mean that no other bridges were being thrown over the gap between pre- and para-clinical subjects on the one hand and the clinical subjects on the other. J. B. Leathes, not only the Professor of Physiology but also a member and later the Chairman of the Education Committee of the General Medical Council, was a powerful protagonist both nationally and locally of the view that anatomy and physiology should be more clearly shown to be related to clinical medicine. In Sheffield he was able to achieve some modest degree of inter-digitation of anatomy and physiology with the clinical subjects and was himself appointed as an honorary physiologist in the Royal Hospital. But it took many years before the lump of clinical teaching was fully leavened by scientific knowledge and doctors' attitudes infused with the spirit of enquiry. Much resistance had to be

overcome as has been graphically recalled in Gwyn Macfarlane's account[7] of Florey's experiences as Professor of Pathology in Sheffield between 1932 and 1935.

The movement for full-time clinical chairs received a strong impetus towards the end of the Second World War. In March 1942 the Minister of Health had appointed a small but eminent interdepartmental committee to enquire into the organization of medical schools under the Chairmanship of Sir William Goodenough.[8] Amongst the recommendations made almost two years later was that at the earliest possible date 'the staff of every medical school should include a whole-time professor in each of the departments of general medicine, general surgery and obstetrics and gynaecology'. It added that whole-time appointments might also be desirable in child health, social medicine, and anaesthetics though it did not exclude some part-time teachers. The response of the government was prompt. It expressly recognized *the importance of medical education and research in the future of the country's health service,* and therefore also accepted the principle of increased grants for that purpose which could be distributed by the University Grants Committee. Sheffield University was quick off the mark; by 1946 Professor (now Sir Charles) Stuart Harris had been appointed as the first full-time Professor of Medicine and in due course other full-time members were appointed to his staff. Six years later a further four full-time professors had been appointed and so the process has gone on and has been matched by similar progress in other universities.

THE PERIOD 1950 TO 1980

In the last thirty years medical schools have advanced steadily. The undergraduate curriculum has been improved; pre-clinical and clinical studies are now much more closely interwoven, full-time professorial clinical units are the norm, and many more Chairs have been established in minor but important specialties. Perhaps the most important

advance of all is the general acceptance of the view articulated in the report of the Royal Commission on Medical Education,[9] issued in 1968, that every doctor 'who wishes to exercise a substantial measure of independent clinical judgement will be required to have a substantial post-graduate professional training'. This view has many implications. One is that the universities, the Colleges and the Health Departments should co-operate in the provision of agreed patterns of training linked to proper career structures. This notion of continuing education carries with it the corollary that undergraduate medical education should be 'to produce not a finished doctor but a broadly educated man who can become a doctor by further training' (to use the words of the Royal Commission) and should therefore be regarded as providing an education based on medical *science* with its emphasis on causal relationships rather than the memorizing of anatomical and other details. But perhaps historians may record the most important single factor which has improved medical education as being the higher intellectual quality of medical students which, of itself, would have required a response from the universities in making the medical curriculum richer and more intellectually demanding. Two events brought about this state of affairs. The first was the government decision which gave every student who was admitted to a course of studies leading to a degree in a university an entitlement to receive the full cost of fees plus that part of his cost of living which his parents were judged unable to bear. Before this 'mandatory award' was instituted very few students of ability from the lower occupational groups could find the necessary financial resources to see them through the long medical course. Secondly, the establishment of the National Health Service itself created an increased demand for medical graduates each of whom could be guaranteed a career which would be both interesting and lucrative as well as conferring an enviable social status. The results of these changes are described in the next chapter.

All undergraduate medical education is concentrated in

the universities but the same is not true of postgraduate medical education which may be divided into three parts. First there is that postgraduate education which is acquired by research through a higher degree, e.g., a PhD and here research in medicine is no different from research in any other subject and universities are responsible for the provision of the necessary facilities and for the maintenance of the standards. But the vast majority of postgraduate education in medicine is of quite a different kind, deriving from, on the one hand, the immense amount of medical knowledge which necessitates that individuals must specialize in some particular aspect and, on the other hand, the rapid rate of advance of knowledge which leads to changes in patient care and treatment. The first has the consequence that the newly registered doctor must embark on the study and practice of one particular area or subject, for example, orthopaedics, general practice, paediatrics, etc., with great thoroughness and over a considerable period of time. This calls for 'in-service training', combining formal instruction and supervision of clinical work by a fully qualified specialist. Here the role of the universities is the relatively minor one outlined at the beginning of the chapter. A major responsibility lies with the Royal Colleges and Faculties which specify the forms of training, conduct the examination and admit the successful candidates into some level of membership. Except for training in general practice the NHS hospitals are the main venue for this work and the duty is laid upon the Health Departments to provide facilities for doctors in their training grades including time for them to study. Some of these hospitals must be highly specialized and some of these are associated with special university institutes which are dedicated to research and advanced teaching in the relevant specialty. The proliferation of specialisms may be necessary but it can also be educationally disadvantageous. Specialists tend to see in their patients only those aspects of malady which come within the specialists' own particular knowledge and interest. But not all diseases recognize these specialist

boundaries; the causes and the effects of some diseases may transcend these boundaries and therefore specialists should be encouraged by their education to adopt a holistic approach to their patients' problems. It is a debatable question whether the importance of this approach has not hitherto been somewhat neglected in postgraduate medical education. Finally, the third part of postgraduate education is that necessary to meet the need of every doctor to keep up to date. The busy practitioner needs easy access to postgraduate medical centres where short courses, discussions, and seminars can be held; where libraries are available, and which are also frequented by the local specialists. Where there is a University Medical School this is the natural locus for such a centre but outside London, medical schools are far apart and so the onus for providing much of this postgraduate medical education must lie with the National Health Service.

It was clearly seen by the Royal Commission on Medical Education that, with such a multiplicity of subjects and organizations involved, there ought to be a national forum for the discussion of the planning and organization of postgraduate education linked to similar bodies at the Regional level. A non-statutory Committee for England and Wales (CPGME) and a similar body for Scotland were established in 1970. The Council for Postgraduate Medical Education for England and Wales sits under a Chairman appointed by the Secretaries of State for Social Service and for Education and Science and has members drawn from the universities, the Royal Colleges and Faculties, the Health Authorities, the DHSS, the Welsh Office, and the medical and dental professions and is attended by an observer from the General Medical Council. Parallel bodies, called Regional Postgraduate Committees, of broadly similar composition exist at Regional level and an Advisory Committee of (university) Postgraduate Deans provides a channel of communication between the Council and the Regional Committees. These and other bodies, bewildering to the outsider in number and nomenclature, have in the last 10

years done much to encourage and systematize British postgraduate medical training, to facilitate co-operation between various autonomous bodies and to promote the growth of very beneficial postgraduate centres.

MEDICAL RESEARCH

Within the life-time of many now living a large number of transmissible, disabling, or lethal diseases such as poliomyelitis, tuberculosis, smallpox, and diphtheria have been eradicated from the Western world. Many other diseases have been cured or halted in their development or ameliorated by medical and surgical procedures which were unheard of twenty years ago. These developments rest largely upon scientific advances in our knowledge of biochemistry, physiology, and pathology and also in no small degree on the development of non-invasive precise diagnosis such as is now available through x-ray, ultrasonic and positron emission tomography, all products of research and development in the physical sciences and engineering carried out in many countries. As will be illustrated in chapter 4 the record of the United Kingdom in this research and development has been distinguished. The case for continued effort in medical research does not rest on the proposition that to refrain from research would deny this country from receiving its benefits. After all, diagnostic apparatus, wherever manufactured, can be acquired by all who are able to pay and the same applies to pharmaceuticals, surgical instruments, etc., whilst knowledge of some medical or surgical procedures is freely available through the universally accessible medical literature. The case is much more complex than that and rests on many distinct but related arguments. The first is the economic gain that can come from the successful export of pharmaceuticals or apparatus devised and manufactured in this country. The names penicillin, cephalosporin, cymetidine, and β-blockers only need to be mentioned to demonstrate that our record in discovery and invention is creditable. It is less

so in export because of deficiencies in manufacture, technical service, marketing, and commercial investment but such failures do not invalidate the argument and mistakes which are recognized can be avoided in the future. Much more important are the benefits which research brings to medical treatment and which, though unquantifiable in monetary terms, are nonetheless real and valuable. These arise from the fact that new knowledge, wherever acquired, is better and more quickly applied by those who have been educated in medical schools where research is actively prosecuted. Moreover, this educational experience is favourable to the development of the enquiring mind, that passion to know, and a healthy scepticism which should be part of the intellectual armoury of the good doctor. Finally, there are many aspects of medicine which attract able young people to a career in it including that of high pecuniary remuneration, but experience shows that a record of distinguished research is a powerful influence in recruiting the most able.

In Britain medical research is financed by the medical charities and the Medical Research Council as well as by the universities themselves. The growth of the funding by the UGC and the Research Councils for research has been described and it is now time to look at the origins of the Medical Research Council itself.

THE GROWTH OF THE MEDICAL RESEARCH COUNCIL

Christopher Addison was born in 1869, the son of a tenant farmer in Lincolnshire. After a period at a private boarding school in Harrogate, of which Addison formed a rather low opinion, he went to the Sheffield Medical School in 1887. His period at the School coincided with that change in its fortunes from which it never looked back. After one year in the old building the School moved into new premises immediately opposite Firth College, which facilitated the burgeoning co-operation between them. From thence Addison went to St Bartholomew's Hospital where as Lord

Horder has recalled,[10] he was recognized as a most gifted student with a particular flair for anatomy. These qualities had not gone unnoticed in his student days at Sheffield. They had attracted the attention of Arthur Hall (later Sir Arthur Hall to whose versatility and devotion the Sheffield Medical School owed so much) who also knew that Addison coveted a full-time teaching post in a medical school. Consequently, when the talks between the College and the School indicated that a preliminary to the desired amalgamation of the two institutions must be the appointment of a full-time head to at least one of the departments of anatomy and physiology, Arthur Hall explained the position to Addison who was then appointed Medical Tutor in April 1894 with the expectation of greater responsibility to follow in a short period of time. Eighteen months later he became the full-time salaried Lecturer in Anatomy and, jointly with Arthur Hall, he started advanced courses in that subject and in physiology suitable for a primary Fellowship of the Royal College of Surgeons examination. It has been written of Addison in these early days that

> He was a first rate teacher and real friend of the students, whom he understood and inspired. . . . Extra, voluntary, courses in Anatomy were started, numerous permanent anatomical preparations made and a general forward impetus was given.[11]

On the penultimate day of that year a Sheffield surgeon, Arthur Jackson, died. He was the fourth son of Henry Jackson, surgeon of the Infirmary, who was one of the early supporters of the Medical School at the beginning of the nineteenth century. Arthur Jackson had given immense service to the School and it was his determination and energy which prevented the School from collapse during the difficult period of the 1880s. In the summer of 1896 his widow offered £5000 to the School to establish a Chair of Anatomy in memory of her husband. The authorities felt that the right man was on the spot and, at the age of 28, Addison was appointed Arthur Jackson Professor. The quality of his scientific work was quite outstanding and he

rapidly made a name for himself, not simply as an anatomist who produced work of great scientific merit, but because his surface maps were of great utility to surgeons and, in particular, those who needed to know the position of the underlying abdominal organs. 'Addison's plane' is known to this day by doctors. His qualities were early recognized. When he was only 32 years old he received an invitation from the Royal College of Surgeons to be Hunterian Lecturer; no clearer indication could have been given that a new and bright star had arrived in the medical firmament. He moved to London and all the indications were that he would have a meteoric career in medicine because in the next five years he became in rapid succession Dean of first Charing Cross Hospital Medical School and then St Bartholomew's Hospital Medical School. In the latter appointment he became acutely aware of the ill-health of the poor East Londoners and how a great deal of this was attributable not just to low wages and poor diet, but to insanitary housing and poor environment as well as a very limited access to proper medical care. It must have been the turning point in Addison's life when he realized that only a two-pronged attack on this problem, namely, the provision of a freely accessible health service and also better housing and sanitation, could enable a solution to be reached. The necessary scale of provision was so large that Addison realized it could only be met by public funds and therefore required decisions in the House of Commons. To Addison's logical mind it seemed clear that he could do more to improve the lot of the poor and needy in Parliament than as a doctor.

The rest of his career is well known. He successfully captured the London constituency of Hoxton from the sitting member in January 1910 and increased his majority in the General Election of December that year. In the following May Lloyd George introduced his controversial National Insurance Bill by which every employed person would pay 4 pence per week which was to be augmented by a further 5 pence provided by employers and the State,

thereby creating a fund from which weekly payments could be made over a limited period of time to those who were ill, or otherwise disabled, or who had to face maternity or treatment costs; the last was especially important because of the prevalence of tuberculosis. A major obstacle to the passage of the Bill was the opposition of the British Medical Association. This was not the last time that that Association was to be an impediment to social progress. The BMA was concerned primarily with the earnings of its members but it also had other respectable objections to the administrative machinery that was to be set up. Who better than Addision, whose distinction as a doctor, whose social concern and therefore commitment to what the Asquith Government was trying to achieve could not be questioned, to mediate between the BMA with the powerful lobby it could command and the Government? His own patent integrity, his plain speech to both sides made him singularly effective so that by the time the Act was approved it incorporated amendments which Addison had been instrumental in persuading the politicians to accept. For its part the BMA, though many of its prominent members had come to dislike Addison, was resigned to the fact that the Bill would become law and that it must work with it.

Section 16(2) of the Insurance Act provided that the government should reserve 1 penny per insured person per annum to be spent on medical research. This amounted to some £57,000. How this money was to be spent had not been clearly thought through and here Addison's role was decisive. Because of the respect he had won from the politicians for his work on the Insurance Act, he had been appointed to the Tuberculosis Commission and the final report[12] of that body, issued as a White Paper in March 1913, was remarkable for the fact that it pressed the case for using the £57,000 for research directed to the improvement of *all* diseases and not merely tuberculosis and urged that a Committee, with executive powers and served by an Advisory Council, should be appointed to deal exclusively with medical research. Addison, who had been involved in

framing the terms of reference of this Committee, was appointed a member together with two other lay members (Lord Moulton as Chairman and Waldorf Astor MP) and six scientists. The records show that in its earlier years a tension existed between those advocating concentration of research on a few pressing specific problems and those wishing to encourage able people with good ideas and a proved record of achieving advances in scientific knowledge. Addison belonged to the group urging this latter policy which, however, could not be maintained throughout the War when the resources of the Medical Research Committee were turned to more urgent problems such as wound infection, the nutritional basis for food rationing, toxicological problems in munition factories, and so on.

Addison's own qualities and his close association with Lloyd George over the passage of the National Insurance Act led to his rapid promotion. He became Minister for Munitions in 1915 and Minister of Reconstruction in 1917. The latter post was very much to his taste but the very word, reconstruction, had about it the flavour of building a new society which would sweep away many of the evils of the old. Within this new society Addison saw a prominent place for a Ministry of Health but it was not until 7 November 1918 that Addison introduced the first reading of the Ministry of Health Bill and the following day he was asked by Lloyd George to become the first Minister of Health whenever that Ministry should be established. Before the Bill was passed there was a General Election in which Addison was returned with a greater majority and was given the office of President of the Local Government Board where his first task was the introduction of the Ministry of Health Bill in the shaping of which he was helped by two remarkable Civil Servants, Sir Robert Morant and Sir George Newman, the latter a doctor. The momentum for the passage of the Bill was further increased by the Report of the Machinery of Government Committee[13] chaired by Lord Haldane which, as has already been mentioned, made important recommendations about research. Addison now

found himself in an interesting intellectual position. On the Medical Research Committee he had shown himself very much in sympathy with the idea that the policy for medical research and its implementation should be in the hands of a body independent of Government Departments; as a future Minister of Health he must nevertheless have been tempted to take control of medical research in the country and there were many who urged on him that this was the logical and necessary step. The position was even more intriguing in that shortly after the second reading of the Ministry of Health Bill an amendment was accepted, based on a memorandum on the work of the Medical Research Committee and carrying a preface by Addison himself in which he reflected on this temptation and why no Minister of Health should be exposed to it. He wrote.

> A progressive Ministry of Health must necessarily become committed from time to time to particular systems of health administration . . . a particular Minister may hold strong personal views on particular questions of medical science or its application to practice . . . a keen and energetic Minister will quite probably do his best to maintain the administrative policy which he finds existing in his Department, or imposes on his Department during his term of office. He would therefore be constantly tempted to endeavour in various ways to secure that the conclusions reached by organised research under any scientific body, such as the Medical Research Committee, which was substantially under his control should not suggest that his administrative policy might require alterations . . . it is essential that such a situation should not be allowed to arise *for it is the first object of scientific research of all kinds to make new discoveries, and these discoveries are bound to correct the conclusions based upon the knowledge that was previously available and, therefore, in the long run to make it right to alter administrative policy.* . . . This can only be secured by making the connection between the administrative departments concerned, for example, with medicine and with public health, and the research bodies whose work touches on the same subjects, as elastic as possible, and *by refraining from putting scientific bodies in any way under the direct control of Ministers responsible for the administration of health matters.*

So it was that the congruence of thought of two remarkable men, Haldane the lawyer and Addison the medical scientist, both of whom had turned to politics as their chosen route to improving the lot of men, ensured that the Ministry of

Health Act 1919 included a clause which transferred responsibility for the Medical Research Committee to the Lord President of the Council, who would become the Minister responsible to Parliament for its activities. A year later the Committee was renamed the Council and received its Royal Charter. When the National Health Service came into being its founding Act reaffirmed the place of the Medical Research Council within Government and this led to the granting of a supplemental Charter in 1949 which underwent a minor amendment in 1957. The Medical Research Council was not disturbed from its organizational place until the Science and Technology Act of 1965 when, as described in the last chapter, responsibility for all the Research Councils devolved upon the Secretary of State for Education and Science.

CONCLUSION: 1919, THE SEMINAL YEAR

For the world of learning and especially science and medicine in Britain, 1919 is a year to remember. It was then, 30 years after the first Committee had been set up by government to distribute £15,000 per annum to ten university colleges, that the University Grants Committee was established under a Treasury minute as described in chapter 2. This made possible the steady increase in the flow of government resources to the universities and their rapid expansion in the 1960s without the infringement of any essential academic freedom. It was also the year in which, for the first time, the government, through the UGC, received and accepted bids from universities for resources to establish full-time chairs in medical subjects the occupants of which would have clinical responsibility for the care of patients. Many universities instituted or completed the procedures for the establishment of the PhD degree without which the great expansion of research and research students in the universities would not have taken place. It was also the year in which Haldane's Committee enunciated the principles which should regulate the government's involve-

ment in science and this, combined with Addison's far-sightedness, led to the establishment of the first Research Council to bear that title and, by implication, secured the independence of the Department of Scientific and Industrial Research. When, in later years, other Research Councils were established their independence was never in question. Finally, on the 3 June 1919, the Ministry of Health Bill received the Royal Assent and just over three weeks later the Ministry of Health was established with Addison as its first Minister. It could be argued that this was a necessary precursor to the establishment of the National Health Service for, without the experience gained in the next two decades, it would have been difficult for the National Health Service to begin its work on 5 July 1948. Before turning to a discussion of the NHS we must first take a look at the development of medical education in recent years and how the dual support system for research in medicine has fared.

4

1980, an end to expansion?

INTRODUCTION

In chapter 3 it became clear that 1919 was a year of decision, of major importance for the universities and the research councils, especially the Medical Research Council. In the next twenty years modest growth took place in the universities and the two research councils, to which in 1931 had been added the Agricultural Research Council, but these changes took place without any fundamental alteration in the organization or *modus operandi* of either type of institution. The expansion of both was resumed at a more rapid pace after the Second World War. In the universities this expansion was fuelled by the increase in the proportion of school pupils who did not leave school on attainment of the minimum school leaving age and also by the automatic granting of financial support to university entrants. The success of science-in-action during the war had given credence to a pervasive belief in 'better living through science' and this provided the impulse for the expansion of the resources of the research councils. 1963 was a land mark in this process, being the year in which the Trend and Robbins Reports[1] were issued. The former led to the Science and Technology Act of 1965 and ultimately through the added influence of the Heyworth Report[2] to the creation of the family of five research councils (Science, Medical, Agriculture, Natural Environment, and Social Science), the transfer of the responsibility for their funding to the Department of Education and Science and the restatement of the purposes of research councils in the manner foreshadowed by the Haldane Report.[3] The acceptance by the

Notes and references begin on p. 163.

government of most of the recommendations of the Robbins Report, established a right of entry to the universities of the 'able and willing' school leavers who could also rely on full financial support if their academic progress was satisfactory. This decision gave added momentum to the expansion of existing universities and to the increase in the number of universities by the creation of many new universities and the transformation of the Colleges of Advanced Technology into technological universities. 1972 was also a year which, at the time, seemed to be significant for both the universities and the research councils. The White Paper *Education, a Framework for Expansion* was issued.[4] It endorsed earlier decisions to expand higher education, setting a goal for 1981 for the age participation rate, defined as a percentage of the 18 year-old age group entering higher education, of 22 per cent. Research councils were affected by the government decisions, incorporated in another White Paper *Government Research and Development*,[5] leading, *inter alia,* to the transfer of funds from the Agricultural, Medical, and Natural Environment Research Councils to various Government Departments, including Environment, Health and Agriculture, and Food and Fisheries.

What has happened since 1972 and where that now leaves the research councils and, in particular, what these changes have meant for medical education and research are the subjects of this chapter.

THE ANATOMY OF THE UNIVERSITIES

Table 1 displays the number of full-time students in United Kingdom universities immediately before the Second World War, in the Robbins-Trend year of 1963–4 and in 1980–1. They show that at the undergraduate level the percentage of students reading degrees in the arts and humanities has remained constant and that the major change has been a redistribution between subject areas in science-based subjects. Especially noteworthy in this connection is the increase in the percentage of students studying pure science,

Table 1. UK university student numbers 1938 to 1981.[6]

	1938/9		1963/4		1980/1	
	Numbers	%	*Numbers*	%	*Numbers*	%
FULL-TIME						
Undergraduate						
Arts and Social Studies	21,199	45·2	48,035	44·6	115,600	46·0
Pure Sciences	6,393	13·6	27,433	25·5	57,800	23·0
Engineering and Technology	4,930	10·6	14,942	13·9	36,800	14·6
Medicine, Dentistry, and Health	13,438	28·6	14,480	13·4	27,900	11·1
Others	980	2·0	2,801	2·6	13,000	5·2
Totals	46,908	100·0	107,691	100·0	251,200	100·0[b]
Postgraduate						
Arts and Social Studies	1,175	38·0	6,494	34·6	15,500	32·6
Pure Sciences	1,268	41·0	6,882	36·7	10,800	22·7
Engineering and Technology	388	12·5	3,557	18·9	6,400	13·5
Medicine, Dentistry, and Health	198	6·4	1,359	7·2	3,600	7·6
Others	65	2·1	468	2·6	11,200[a]	23·6
Totals	3,094	100·0	18,754	100·0	47,500	100·0[c]
Total full-time students	50,002		126,445		298,700	
PART-TIME						
Undergraduate	—	—	9,714		4,500	
Postgraduate	—	—	6,814		27,400	
Total part-time students			16,528		31,900	

Notes

(a) Includes 8700 students studying for the Post-graduate Certificate of Education.
(b) 8 per cent (=20,000) are from overseas; of the home students 61 per cent are male, 39 per cent female.
(c) 35 per cent (=16,600) are from overseas; of the home students 65 per cent are male, 35 per cent female.

mainly the biological subjects, at the expense of medicine, dentistry, and health. These changes are explicable partly as a result of policy decisions such as the planned limitation on entries into medical schools, discussed further in the next section, and the attempts to maintain science-based undergraduate places at not less than 50 per cent of the total. These percentages do not conform with those of the applicants' own choices with the result that, for example, the chance of acceptance has for some years been lowest in medicine and highest in physical sciences which carries with it the corollary that minimum entrance requirements are highest in medicine and lowest in physical sciences. There is little doubt that many disappointed applicants for places in medical schools have been admitted to read a biological subject. Some of the latter may enter medical schools later. The undergraduate figures, corresponding to an age participation rate in universities of about 7 per cent in 1981, reasonably close to those predicted by Robbins for that year but far below those which would correspond to an age participation rate of 22 per cent for the whole of higher education and announced as a target in the 1972 White Paper to which reference has been made. In fact entries and applications began to fall below the expected values in 1970. No-one can be sure of the cause of this departure from projections. Possibly it was due to school leavers seeking the security of immediate employment having calculated that, given the trends in financial remuneration of people in different sectors of employment, a decision to enter directly into work at 17 or 18 might lead to an income at 25 which would not be less than that of a graduate of the same age. As youth unemployment increases so this pattern of choice may be reversed as happened in some degree in the depression of the early 1930s.

Also evident from Table 1 and particularly noteworthy is the growth in the number of postgraduate students. Thus in the 42 year period during which undergraduate numbers multiplied by a factor of about $5\frac{1}{2}$, that for postgraduate student numbers was over 15, reflecting the fact that, as in

the United States of America, a higher degree was becoming a *sine qua non* for entry into certain types of professional employment. Another change is the increase in the proportion of overseas students, especially at the postgraduate level, where they now comprise just over one-third of all postgraduate students and in some subject areas, for example, engineering, technology, agriculture, forestry, and veterinary science, they form over half. The causes are not far to seek. Given the 'swing away from science' of the 60s and early 70s, combined with the decline in the size of the 18 year-old age group from the end of the 50s with a minimum at about 1970, the percentage of school pupils staying on beyond the age of 16 would have had to increase dramatically (which it did *not*) to ensure that the number of adequately qualified applicants for science-based university places did not decrease. The planners did not allow for this and arranged that the number of science-based places should increase at the same rate as the size of the university system as a whole. Therefore, there were inevitably some places, especially in physical sciences, engineering, and technology, which could not be filled by students domiciled in the United Kingdom. It is not surprising that the universities, firmly believing that the UGC grant is related to a university's recent past record of keeping to its target numbers, should 'abhor a vacuum' even more than Nature and therefore they offered the 'vacant places' in these subjects at the undergraduate level to well-qualified applicants from abroad. These arguments also lead to the prediction that this situation was bound to correct itself in the late 70s and early 80s as the 'swing' falters and shows some signs of reversal and the 18 year-old age group builds up to its peak value in 1983/4. Any trends in the patterns of British entrants to universities are bound to be repeated three or four years later in the subject distribution of British graduates eligible to receive postgraduate research awards or to be appointed as research assistants to investigators holding research grants and contracts. Consequently there was a decline in the size of the pool of British graduates in

physical science and engineering in the later 60s and early 70s. This coincided with a period of growth in the number of research studentships and grants in these fields. There were scarcely enough British graduates of adequate quality to receive research studentships. At the same time many good quality graduates of foreign universities were applying for places as research students. Members of academic staff, especially those in engineering and technology, anxious to accomplish research, were therefore willing to accept foreign students. Many of these students who were not financially self-supporting were appointed to research assistantships. The proportion of overseas postgraduate students steadily increased and any deterrent effect of the introduction of higher fees for overseas students, first in 1967 and again almost ten years later, did not produce by 1980 any reversal of this trend, with the results shown in the footnote (c) of Table 1.

Other changes, not all of which are shown in Table 1, deserve comment. First and foremost is the progress made by women in university education in the United Kingdom. Thus just five years earlier than the percentages given in notes (b) and (c) in Table 1 for 1980/1 the percentages of women were only 36 per cent amongst the UK undergraduates and 30 per cent amongst postgraduates. These percentages are far from being uniformly distributed among subjects. For example, less than 8 per cent of the undergraduates in engineering and technology are women and the position is only slightly better in the physical sciences. Sadly, there are indications that school reorganization insofar as it increases the number of bi-sexual schools may affect this trend adversely because it seems that girls in mixed schools are less likely to opt for science specialization than would be the case if they were in exclusively girls schools.

It has become fashionable to judge publicly-funded enterprises by those measures of performance used in industry such as productivity, i.e. output per man-year employed, and to expect that this productivity will

constantly increase. There are several difficulties in applying this concept to university work. In the first place the university teacher's work is highly labour-intensive and, like that of a good violin maker, does not admit of an indefinite increase in productivity. Secondly, it is difficult to measure the quality of the product, whether this be that of the graduates or the research and scholarly work which is done. Some critics say that the ratio of students to staff is unduly favourable, i.e. small, in the United Kingdom as compared with other countries. Table 2 shows how this has changed over time for universities in Great Britain. Oxford and Cambridge are excluded from the first two columns because before the Second World War a significant fraction of their staff were not paid from public funds (UGC sources) but from the endowments of individual colleges. However by 1980/1 Oxford and Cambridge were much more comparable in their finance with other universities and, therefore, they have been included for that year. To those unfamiliar with universities the wide variations of student-staff ratio will be puzzling but, in fact, are readily explicable as being due to influences such as the economies of scale (pre-war Scotland had, with the exception of St Andrews, much larger universities than the rest of Great Britain and especially Wales), commitment to small-group teaching (less marked in Scotland with its tradition of lectures to large audiences, especially in the first year, rather than to tutorials) and so on. The startling change in the ratio for medicine is a reflection of the great change in clinical teaching which, as mentioned in chapter 3, was provided almost entirely by non-academic staff before the Second World War and is now largely given by whole-time clinical academic staff. The rise of the ratio in non-medical subjects in recent years is a direct consequence of the reduction of the unit of financial resource which began with the high inflation rate of 1974 and took a further plunge downwards in 1980. The stability of the ratio in medicine during the last two decades is the result of a policy decision of the UGC to protect medical education from this decline

during the planned expansion of the entry into medical schools which is referred to below.

Table 2. Ratios of full-time students to full-time staff.[6]

	1938/9	*1963/4*	*1980/1*
Average Great Britain[a]	16·2	7·3	9·0
England[b]	9·5	6·9	9·0
Scotland	13·9	8·4	8·7
Wales	7·5	7·5	9·3
Arts and Social Studies	11·0	8·4	11·9
Pure Science, Engineering and Technology	5·0	7·0	8·3
Medicine	28·6	5·0	4·9[c]

Notes

(a) Excludes Oxford and Cambridge for 1938/9 and 1963/4.

(b) No distinction is made between under-graduate and post-graduate students.

(c) Includes dentistry, pharmacy and pharmacology.

To the outsider these ratios may appear generous compared with the averages for comprehensive schools. However, they are not so very much smaller than those which obtain in the sixth forms of those schools. As always the proof of the pudding is in the eating; the output of graduates at first and higher degree levels is high per member of staff employed because of the smallness of the percentage of entering students who fail to graduate, and the short duration of British university courses, neither of which would be possible with much less generous student-staff ratios.

This last comment leads naturally to the question of costs. In an age when, as in Britain, the excellence of some of our universities is less likely to provoke admiration and pride based on the realization that such institutions are pace-makers for the future which benefit all, than they are to arouse the easily-mobilized envy of the egalitarians, attention is focussed on the supposedly high cost to the nation of British universities. To this latter group it should be pointed out that, in those subjects common to the universities and

the polytechnics, the cost of producing a graduate is lower in the universities. This is due to the higher failure rate and the lower student-staff ratio in the polytechnics; yet these latter institutions produce a minute amount of research as compared with the universities. One can go further and assert, without fear of contradiction, that compared with other countries in the western world where the courses are longer and less well structured, where there is less small group teaching and, consequently, higher wastage rates, the universities of the United Kingdom produce graduates of a quality which is highly esteemed internationally at lower cost. Furthermore, as Table 3 (opposite) shows, British universities perform a massive role in continuing education which has not really been recognized and they do it at relatively little cost to the taxpayer. The number of students enrolled in continuing education exceeds that of full-time students. As the UGC has itself commented[7]

Continuing education comprises extramural courses, post-graduate medical courses, and post-experience courses run by other university departments. In general, these courses are of short duration, with about 90% being of less than 50 contact hours in length. In 1980/1, universities in Great Britain ran 17,264 such courses, attended by almost 400,000 students (an average of 23 per course), and representing 10 million student hours (averaging 25 hours per student).

Of all continuing education courses, nearly half are organised for vocationally recruited groups, the largest group being medical/dental practitioners (41%), followed by industry/commerce (19%) and education (16%).

Good as the record of British universities undeniably is, the prospects for maintaining it are much less hopeful. Firstly, there is the economic situation and the manner in which government has chosen to deal with it, which imposes curbs on public expenditure. Added to this is the demographic element; the sharp decline from its peak in 1983 of the size of the 18 year-old age group by as much as one-third to the next minimum in 1995, a decrease which provides a credible justification for diminishing the size of the resources for universities to a government which has

Table 3. Subjects of Continuing Education in 1980/81.*[7]

	Student enrolments on:			
	Extramural courses		*Other courses**	
Subject group	*Number (000's)*	*% of total*	*Number (000's)*	*% of total*
Education	8·3	3	35·2	41
Medicine, dentistry and health	2·3	1	8·5	10
Engineering and technology	4·1	2	9·5	11
Agriculture, forestry and veterinary science	1·3	1	0·5	1
Biological and physical sciences	30·4	13	5·4	6
Administrative, business and social studies	53·6	22	14·7	17
Architecture and other professional and vocational studies	9·1	4	3·6	4
Language, literature and area studies	34·8	15	7·0	8
Arts, other languages	95·0	40	1·3	2
All subjects	239·0	100	85·7	100

*Excluding post-graduate medical courses

conveniently disregarded the recommendations of one of its predecessors on age participation rate published 10 years ago.[4] The manner in which these changes, the 'restructuring' of British universities and the rises in overseas students fees are to be accomplished are in themselves, wasteful and damaging to Britain's long-term overseas influence and interests. A particularly worrying current problem arises from the enforced contraction of university resources combined with the age distribution of the staff, the majority of whom have tenured appointments, i.e. for life, which makes rectification of the mal-distribution costly. For whatever reason, cowardice or something more respectable, reform of the tenure system is unlikely to take place in the foreseeable future. The universities are therefore faced with a period in which the recruitment of new staff will be very

small indeed. Institutions where change should be the norm and stasis is retrogressive, will thus be deprived of the imagination and creative abilities of young people. Whether the universities can survive and later recover from this debilitating deprivation and regain their vitality and quality is today an open question.

MEDICAL EDUCATION IN THE UNIVERSITIES: THE FACTS

In the last two decades there have been significant changes in medical education in British universities. The intake of medical students has increased in number and quality; London University now accepts a smaller proportion of the total; three new schools have been created and curricula have been revised. These changes have already made an impact on the universities and they create problems as well as opportunities for the National Health Service. They also cost a great deal of money. At a time which coincides with the end of expansion and of a plenitude of resources for university medical faculties it is appropriate to take stock of the present position and how it was reached.

Policy-makers are often tempted by (and some succumb to) the siren song of manpower planners in whose ideal world the annual output of skilled manpower in various categories matches exactly the numbers of job vacancies and the total active stock fits precisely the nation's need for their services. Alas, this vision is a pipe-dream which can be realized only momentarily and accidentally because the time constant of the supply side, i.e. the time between a critical decision to work for a particular qualification for employment and the attainment of that qualification, differs from and is usually greater than that of the demand side, i.e. the complex of times for all those processes leading to jobs for new graduates. Only when the demand is precisely set for some years ahead, freedom of choice is limited and the training period short, as in the armed services, is there any chance of modest success in manpower planning. In free societies where personal choice of a career is permitted, it

might be thought that reasonable matching of supply and demand would be achieved for the teaching profession where, if there is a clear policy on pupil-teacher ratios and the minimum school leaving age is fixed, the demand for teachers can be estimated with a fair degree of certainty and the number of teachers being trained can be adjusted accordingly for several years ahead. Yet in the United Kingdom we can hardly claim success when 50 per cent of teachers of 'O' level mathematics have themselves no qualification beyond that level. In medicine, where there is also, in effect, a quantifiable demand based on a predictable population size and composition and a policy decision could be taken on the doctor-population ratio and there is virtually a single employer (the NHS), one would think that the demand could be specified for a few years at least. Unfortunately, medicine also has the longest supply time constant, namely, about ten years. It is therefore not surprising that the policy for target numbers for entry into medical schools has fluctuated. In 1944 the Goodenough Committee[8] recommended that the appropriate intake into British medical schools should be about 2500 students per annum, corresponding to an output of 2100 British doctors six years later.

Thirteen years after this Committee reported another Committee[9] under Sir Henry Willink's Chairmanship recommended to the Health Departments a reduction in the intakes so as to avoid a surplus of doctors, despite the known increase in size of the population and the long steady upward trend of the doctor-population quotient. This report had a bad effect. Both the number and the quality of the intake into medical schools fell and, shortly after Willink reported, there was an insufficient number of British medical graduates to fill junior hospital posts, a deficiency which was made good by immigration. Eight years after Willink, the Royal Commission on Medical Education[10] was established and so concerned was it with the shortage of doctors that it offered interim advice to Ministers over two years before the issue of the final report. That report stated

that in order to remedy the shortage and to meet rising expectations the intake into British medical schools should be doubled to 5000 by 1990. The government response was more cautious, setting a target of 4100 intake by 1979. What has in fact happened?

At present there are thirty-one undergraduate medical schools in the United Kingdom of which twelve are within the University of London, thirteen in provincial universities (including Oxford and Cambridge) and one in Northern Ireland but five in Scotland, of which one has only pre-clinical studies. As Table 4 below shows the universities have responded remarkably well to calls for an increase in the intake. Even allowing for the establishment of three new medical schools at Nottingham, Southampton, and Leicester, the major expansion has fallen on the large civic universities and their medical schools, because the numbers in the London medical schools have been limited by a declining bed provision in hospitals necessitated by population migration from the centre of that city. Just over half the medical schools have an intake of over 100 students and, to ensure a better use of resources, some of the medical schools in London are likely to be amalgamated and brought into closer relationship with multi-faculty institutions. In the 1970s the universities had a plethora of well qualified applicants to read medicine of whom they admitted only about 30 per cent, mainly directly from school but also some mature graduates of high quality who sometimes possessed higher degrees in other disciplines. This severe competition for entry represents a very significant change from the pre-war and immediate post-war eras, as does the change in the proportion of women entrants, which has now risen to one-third, a fact which presents both problems and opportunities to the National Health Service. The backgrounds of medical entrants are of some interest. 70 per cent of them come from homes where the parent is classified as being in one of the three top socio-economic groups (in this respect medical students do not differ much from students in other subjects) but, outside London and Oxbridge, only about

one-sixth of new entrants to medical schools have a parent who is medically qualified, this latter fraction probably represents a considerable change from the position which obtained before the war for which statistics are not available.

Table 4. New entrants and graduates in medicine.[6]

Intake of Pre-clinical Medical Students

Entering October

1971/2	*1972/3*	*1973/4*	*1974/5*	*1975/6*	*1976/7*
3032	3323	3276	3281	3486	3654
1977/8	*1978/9*	*1979/80*	*1980/81*	*1981/82*	*1982/83* (Prov)
3778	3819	3841	3857	3919	4018

First Registerable Medical Qualification

Graduating July

1971/72	*1972/73*	*1973/74*	*1974/75*	*1975/76*	*1976/77*
2343	2289	2543	2644	2749	3045
1977/78	*1978/79*	*1979/80*	*1980/81*	*1981/82*	
3162	3274	3370	3433	3387	

The applicants are of very high quality as measured by performance at 'A' level and this, combined with the universities' wish to be fair in their admission policies, inevitably means that the performance at 'A' level in particular subjects is the main criterion for admission, even though most of the candidates are interviewed and some are set special tests. In the interviews an attempt is made to assess the oracy, literacy, and motivation of the applicant as well as his or her academic ability and qualities of character and temperament. The vast majority of the entrants have 'A' levels in chemistry, some form of biology, and either physics or mathematics so it can be said that they have, for at least two years, seen their role as scientists or visualized science as the basis of a medical career.

The Faculty of Medicine is the most expensive part of any university's activities. This would be expected from the student-staff ratios shown in Table 2 and from the fact that slightly over half of university expenditure goes towards

meeting the costs of the salaries of the academic staff. The unit cost is much higher in the clinical period than in the pre-clinical period because the student-staff ratio is much lower in the former and because clinical teachers frequently have patient care responsibilities and are remunerated on a different and higher scale from that applicable to pre-clinical teachers. The consequences of all this are that in 1977 each medical academic staff member cost his university over £30,000 per annum, exclusive of the running costs of the buildings which he occupied. The contrast between the costs of medical education and the other subjects in universities is strikingly shown by the statement that medical students comprise just about 8 per cent of the undergraduate population of British universities but the recurrent cost of academic medicine represents about 20 per cent of the total for all subjects, notwithstanding the fact that some of the costs of medicine are borne by the NHS in whose teaching hospitals most of the clinical teaching takes place and for which most Health Authorities provide an enhanced level of staffing. Of course, the NHS receives a reciprocal benefit from the contributions which university clinical staff make to the care of patients.

MEDICAL EDUCATION IN THE UNIVERSITIES: STYLE AND CONTENT

The full-time academic staff in the faculties of medicine in British universities are uniquely privileged in that they can attract as students the most able of their age group as judged by examination success and they can also command a disproportionately large share of the universities' resources. This is a far cry from the situation which existed in medical education before the last war and the question cannot be evaded as to whether the quality of medical education and research have changed sufficiently to be worthy of the high quality of students and to justify the high cost. In the author's experience there has been a very great change in the undergraduate curriculum since his sad encounters with

the 'grey books' of the Cambridge Anatomy School. Most medical schools would now accept the late Sir George Pickering's statement[11] of the purpose of the university medical school as that which they are trying to achieve. Sir George saw three functions for medical schools in research, education, and training for a vocation. He described the purpose of education as

> to enlarge and sharpen the mind. The student begins with some understanding of natural phenomena in general. During his medical course he becomes acquainted in greater depth with the form and function of the human body and the way in which it is disturbed in disease. He should learn something of the elements of animal behaviour, and particularly social behaviour in man, and the way in which mind and body react to changes in circumstances in both health and disease. Using this material, his mind is developed in range and precision. Curiosity is preserved and enhanced. The student observes and his curiosity is kindled, he asks a question and he knows how to set about gathering material so that it may be answered. He learns how to assess evidence and form a judgement. He learns a scientific method and that scientific theories are stated in such a way that they are refutable by evidence. He learns also that in every day affairs a judgement often has to be formed on inadequate data.

In commenting on the vocational aspect, when he had remarked on the student's intense desire to serve society and participate in the drama of life and death, Sir George added

> medicine is in some ways the most personal and responsible profession; the patient entrusts his life and his well being to his doctor. Thus, the character and personality of the doctor, his sympathy and understanding, his sense of responsibility, his selflessness are as important as his scientific and technical knowledge. These qualities are already evident at a time when students apply to enter a medical school. It is part of the privilege and duty of an educational system to develop and fortify them. This is done chiefly when the student manages patients under the supervision of his teachers. A system of apprenticeship is not only the best way of developing the ethos of medicine, it conforms with the modern educational practice of learning by doing. Thus, the practice of medicine is a craft or a skill which utilises knowledge. Medicine embraces both a science and a technology.

Curricula have been reformed and there is today undoubtedly a better integration of clinical and pre-clinical studies,

less rote learning, more scope for student initiative and responsibility in projects and elective periods and, wherever possible, an emphasis on the scientific approach to medicine which has enhanced its power and its appeal. Finally, and most importantly, many schools have attempted to make the style of teaching constitute an attractive invitation to learning, thereby imbuing the student with a desire to study which will endure throughout his working life and without which his effectiveness as a doctor is bound to diminish. These are all gains but it has to be said that there are those who are less enthusiastic about the medical curriculum.

Amongst the critics is the 1980 Reith Lecturer, Dr Ian Kennedy, who asserts that medicine has taken the wrong path and is now positively deleterious to the health of the population because it has wrapped itself in the cloak of science and reason so that the doctor-in-training is brought up to regard himself as a scientist seeking causes for the malfunctioning of some parts of the complex human machine; that students are encouraged to see themselves as problem solvers *after* problems have actually arisen and that this therefore deflects their attention from the much more important task of the prevention of ill-health. It is easy to rebut the first charge by pointing to its absurd corollary that medicine would have been less deleterious and possibly even beneficial had it cloaked itself in anti-science and unreason. Dr Kennedy should also be reminded that the prevention of ill-health cannot be achieved without some understanding of its cause and the mechanisms involved in the chain linking that cause to the effect. Prevention of ill-health involves a range of mixtures of public and private decisions, designed to interfere with either the cause or the mechanism. Thus cleaner water, cleaner air, better housing, and sewage systems, which can reduce causation of disease are matters for the public to decide through the democratic mechanism, as are the restrictions placed on the liberty of carriers of certain communicable diseases. On the other hand the immunization of individuals against some commu-

nicable diseases, even though failure to do so may assist the spread of it, is still a matter of personal choice. But neither the public nor the private decision to protect ourselves can ever become a possibility unless there is a sufficient degree of understanding, gained by patient scientific research, of the biological nature of the diseases in question and which, incidentally, often also leads to a means of cure or palliation should prevention fail.

However, it is necessary to look more closely at what Dr Kennedy writes, for he has performed a useful service. One may sympathize with his view that because of defects in their education arising from the absence of discussion of certain non-scientific subjects in their training, students may be less well-equipped to be good doctors. Greater understanding of health education, greater skills in communication, and a deeper understanding of human psychology acquired during training would make the doctor more effective in persuading the patient, distressed and therefore all the more receptive to advice, to change his life-style and therefore enjoy better health and defer, if not prevent, the onset of certain diseases. Probably many doctors do this but more should be encouraged and enabled by their education to do so. Dr Kennedy also touches a nerve when he asks how doctors define illness and whether, in making a diagnosis, they fully understand the philosophical assumptions underlying this act, or the power they exercise when they perform it, and the far-reaching practical implications it may carry for the patient. Is illness, he asks, merely a deviation of a certain magnitude from a norm and, if so, how is the norm established and the critical magnitude arrived at? Such questions may seem trivial in considering whether dwarfs or giants, so different from the norm, are ill when their bodies are functioning satisfactorily but they are far from trivial for a patient and his family faced with health problems connected with behavioural, contagious, or infectious disease. In these cases the doctor, in pronouncing someone ill, may set in train a sequence of events which may deprive an individual of certain civil liberties and the prospect of work.

In the behavioural field the norm is set by the prevailing social and cultural values and expectations and, in diagnosing aberrant social behaviour as due to mental illness, a doctor is often unwittingly acting on behalf of the state rather than his patient. It is uncomfortably close to 1984 not to see how the doctor might slip imperceptibly into becoming the agent of a well-regimented state, as indeed some are in the USSR. One may go a little further and ask whether gene replacement therapy and other possible applications of molecular genetics to medicine pose problems about individuality and the right to tamper with it, however convenient for the patient or society that may be. Other examples could be quoted to illustrate the need for medical schools to make greater use of the opportunities within their own universities to expose their students to aspects of other subjects which are germane to medical practice. The range is very large, from the theoretical to the practical, from a discussion of ethics and accepted social values at the philosophical level to an exposition of the organization and funding of the National Health Service. The usual voices will be raised against such a broadening of the undergraduate medical curriculum but if graduates are not allowed to teach until they have an adequate understanding of educational philosophy and psychology, teaching method, organization, economics, and relevant legislation, why should doctors be exempt from similar subjects relevant to the practice of medicine even if these are not scientific?

POSTGRADUATE MEDICAL EDUCATION

As the Royal Commission on Medical Education emphasized, the day is long past when, whatever the legalities of the matter, a student who had acquired his MB, ChB degrees and completed his pre-registration year was fit to practice unaided. Further training is necessary before the doctor can be entrusted with the sole responsibility for a patient's health. This is no less true of general practice than

it is of the better known medical and surgical specialties. During this training the doctor has to earn his own living and this is why there are training grades in the NHS. This is an area of vocational training in which universities are far from being the sole agents. Nevertheless, they perform two functions which are unlikely to diminish in importance. The first is the supervision of doctors in training grades in hospitals by full-time academic staff holding honorary consultant posts in the NHS, and the second is the provision of centres for continuing education, now acknowledged to be essential if a doctor is to remain effective and efficient. The universities cannot provide all the centres which are needed; these have to be too widely geographically distributed for that to be possible. They can. however, co-operate with other bodies in the provision of more remote centres and they have perhaps something to learn from their colleagues in the extra-mural departments. Such co-operation, by strengthening association of the university medical schools with the postgraduate centres established by the Health Authority, would benefit both that Authority and the University.

The postgraduate role of the university Faculty of Medicine cannot be simply that of being one of the contributors to the vocational training of doctors. If medical science is to advance, if the Faculties of Medicine are to deserve their places in universities and if a proper critical and enquiring attitude is to be inculcated in the student, then his teachers must also be researchers, or at least work in departments where most of their colleagues are actively and enthusiastically carrying out research. Since the university cannot, of itself, provide the full financial support for all the research that is needed, other agencies, notably the Medical Research Council and certain large medical charities, have to augment the resources required to keep university medical research at a proper level. What the British system for medical research now comprises and how it operates today are discussed in subsequent paragraphs.

MEDICAL RESEARCH IN THE UNIVERSITIES

By any test the United Kingdom has an excellent record of achievement in science. Reference is often made to the fact that since 1940 more Nobel Prizes per million of the population have been awarded to British scientists than to those of any other country, a primacy of place which Germany had held in the first forty years of this century. Little significance should be accorded to this fact because such prizes are generally awarded for work carried out several decades earlier and, as in the United States of America, many of the prizes were won by immigrant scientists, many of them Jewish who had been displaced by Hitler from Germany, which country therefore suffered a simultaneous decline in its number of Nobel Prize winners. Of much greater significance as an indicator of the quality, quantity, and utility of the United Kingdom's contribution to scientific knowledge are the citation indices prepared for the American National Science Board.[12] These measure the frequency with which scientific work published by scientists is used by other scientists in the same field and referred to in their own publications. The results for 1973 are shown in Fig. 1.

The United Kingdom has a consistently high position and these indices are entirely uncorrelated with the relative positions of countries in tables of population or gross national product. No doubt this is the consequence of many contributory causes but, since the vast majority of the work cited emanated from universities, an important element must have been the high quality of British universities as compared with those of other countries. This would not have been possible without the full acceptance of Humboldt's motto 'Einsamkeit und Freiheit' by the universities and the adoption of wise policies, consistently applied, to support the best work. Although no citation indices are available for the first decades of this century and their compilation would require resources beyond those available to a single individual, there can be few scientists in any

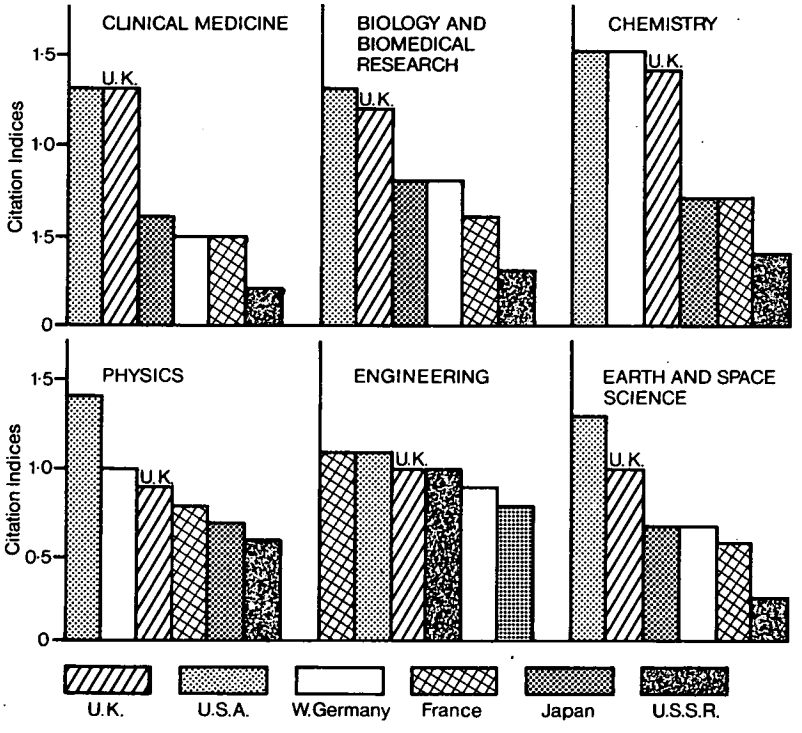

FIG. 1. Citation indices of selected scientific literature by selected fields and countries in 1973.

discipline who would dissent from the view that during that period Germany would have occupied the first place in any such compilation with the other countries as 'also rans', as, indeed, she did in the table of Nobel prizes. It is not unreasonable to identify 1919 as the crucial year for, as we have seen, it was then that Haldane's report set the pattern for the development of the Research Councils, the UGC received its terms of reference, and the PhD degree was established or decisions to do so were taken by universities thereby signalizing their new and enlarged commitment to advanced study and research.

MEDICAL RESEARCH AND THE DUAL SUPPORT SYSTEM

The universities were enabled to develop their research with funds derived principally from two sources; their own income, now in considerable measure provided by the University Grants Committee and therefore given some assurance of continuing into the future, and the Department of Scientific and Industrial Research and the Medical Research Council, which made financial grants to universities largely in response to proposals made by gifted academic scientists but also as a part of the implementation of their own policies. The history of the development of the two wings of this 'Dual-Support System', as it has come to be known, have been outlined in previous chapters. By 1973 the pattern had evolved into that depicted in Fig. 2 in which the figures indicate the amounts of money in millions of pounds at 1973 values which passed to the directions indicated by the arrows in the financial year 1973/4. Two of these sums are estimates and call for special comment. The first is the £96m estimated as the amount of money used by universities from fee plus UGC grant income (both derived from the public purse) for research purposes. Considerable uncertainty must surround this figure because its magnitude depends on the proportion of salaries of academic, clerical and administrative and technical staff (which in total comprise about three-quarters of the universities' expenditure) and the proportion of the costs of equipment, central services such as computers, libraries, maintenance of buildings, etc., which are attributable to research. These proportions are not easily ascertainable when the daily work of the staff in libraries and laboratories includes activities other than research. A questionnaire survey of randomly selected members of academic staff of British universities conducted in the '60s by the Committee of Vice-Chancellors and Principals provides part of the basis of the estimate which, however, would perhaps be better expressed as a figure lying between £70 and £120m. The other sum is the £56m ascribed to input to University

Research from the Research Councils. This, too, is difficult to estimate. Insofar as this relates to direct payments in the form of research grants, costs of research units firmly embedded in universities, the salaries of post-doctoral and senior research fellows, the fees payable by and the maintenance grants payable to research students, and the research training support grants paid to universities in respect of every research student, they can, of course, be precisely determined. However, university researchers benefit from facilities provided by Research Councils to which they have access. These include multi-international laboratories like the European Molecular Biology Organization Laboratories, the Institut Laue-Langevin, CERN (Centre Européenne de Recherche Nucleaire), and the bi-National Anglo-Australian Southern Hemisphere Telescope at Siding Springs, Australia, as well as those national laboratories such as the Rutherford, Appleton, and Daresbury Laboratories of the Science and Engineering Research Council. The precise cumulative value of these benefits is not currently measurable.

This inability to attribute precise figures should imply not a criticism of an imperfect accounting system but a tribute to the flexibility of operation which makes the best and most economical use of resources which is as valuable, if not more valuable, in periods of financial stringency as in times of plenty. But the real justification for a dual support system lies in the fact that it provides the best arrangements for funding basic and strategic research. It has already been explained that a characteristic of both, and especially the former, is the unpredictability of its outcome. Great freedom of choice of what to do must therefore be left to the imaginative investigator who needs general resources not allocated by a central body for a specific research programme for a finite period of time but which the investigator can deploy in the early stages of his work so as to bring him to the point at which he can assess its promise and timeliness and, should his programme then require augmented resources to carry it forward, he can apply for

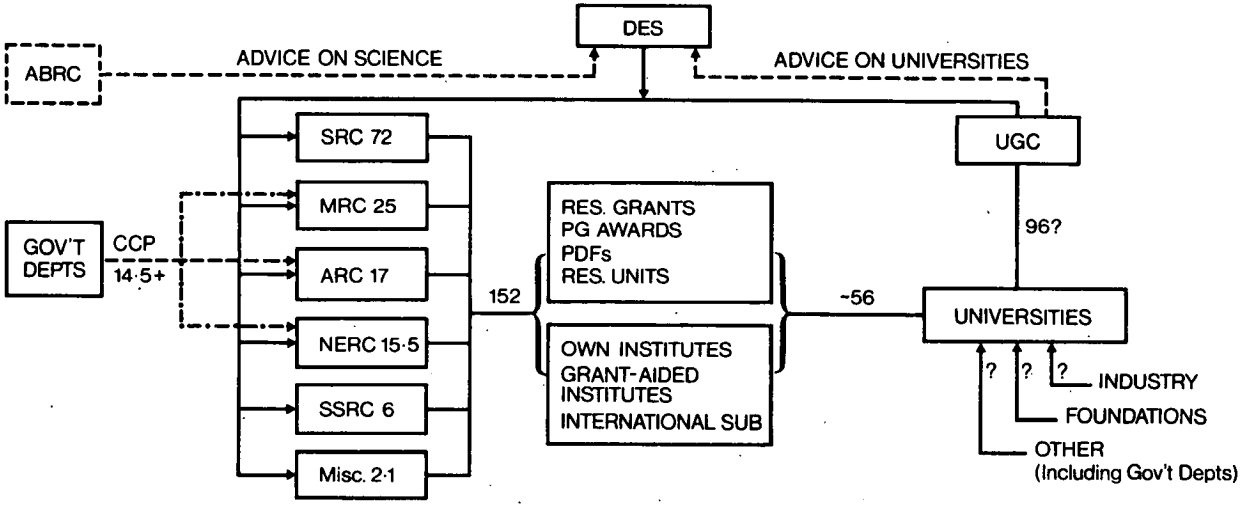

FIG. 2. The dual support of university research.

KEY

CCP=Customer Contractor Principle with RG as Contractor
RC =Research Council
S =Science; M=Medical; A=Agricultural;
NE =Natural Environment; SS=Social Science
PG =Postgraduate i.e. after Bachelor's Degree
PDF =Post Doctoral Fellowship
UGC =University Grants Committee
ABRC=Advisory Board for the Research Councils
DES =Department of Education and Science
Misc =Miscellaneous recipients including Royal Society, Natural History Museum, Office of Scientific and Technical Information

All numbers are £ million at 1973 values

extra non-university funds. In so doing he is putting his ideas to the test of the judgement of his scientific equals or betters, i.e. submitting them to so called 'peer review' and, if he is successful, can expand his own work without detracting from his colleagues' share of university funds. By this means the atmosphere of research which gives vitality to university teaching is fostered and made more pervasive. Moreover, the availability of general university funds is of particular value to young academics by protecting their chance of doing valuable work at a stage when they have not had time to accomplish the volume and quality of research of their seniors which research grant awarding bodies, in their human frailty, are predisposed to count in an applicant's favour. Thus the seed-corn can be preserved, germinate, and grow, future harvests are guaranteed. Other advantages flow from the dual support system. It enables more promising lines of research to be selectively cultivated, permits very expensive and otherwise unattainable projects to be realized, encourages collaboration and, above all, it recognizes that good ideas are generated much more often by the individual creative mind but that only groups of people (the 'community' of a particular subject) and not a single individual are best able to establish the order of priority of these ideas. Thus selectivity is achieved and policies made without quenching individual initiative and creativity.

It is these merits which have accounted for the durability of the system, one which has served this country well and, barring national economic catastrophe, should survive and continue to do so. As was described in the previous chapter the Medical Research Council was a founder member of the Research Council 'Club' and the thought given to problems of medical research by Addison, Morant, and others in the early part of this century laid down many of the essential elements of the fundamental philosophy by which all Research Councils operate. Within this commonality, each has its different style dictated by the needs of the subjects for which it caters. Thus, for the year to which Fig. 2 refers

the Medical Research Council spent about 26 per cent of its resources on its own establishments and facilities such as the National Institute of Medical Research, the Clinical Research Centre, tropical research, and block grants to non-university institutes such as those dealing with cancer; about 30 per cent on research grants, training awards and post-doctoral fellowships in universities, and about 39 per cent on research units and external staff who were often embedded in or located close to universities, whereas other research councils have different patterns of expenditure. By the year 1980/1 the breakdown of expenditure was

	Per cent	
Administration and central expenses	5·8	
National Institute of Medical Research	8·2	23·3%
Clinical Research Centre	9·7	
Block grants to institutions	3·8	
International subscriptions	1·6	
Research units and external staff	36·8	
Project grants	28·4	34·1%
Training awards and fellowships	5·7	

i.e., substantially similar. Presented another way this means that out of a total expenditure of £93m approximately one half was spent in direct support of medical research in universities and one-quarter in indirect support.

UGC figures for 1978/9 quoted in Cmnd 8567[13] show that the money available in that year for departmental expenditure on salaries and wages and materials but excluding centrally provided services (rates, administration, libraries, building, heating, lighting, etc.) for use on education and research in preclinical medicine and dentistry and clinical medicine amounted to £137·4m. Of this, approximately £38m was derived from research grants and contracts and £12m for services rendered mainly to the NHS. The number of full-time members of staff in post was about 4300 and the student load amounted to just over 28,000 f.t.e. These figures correspond to total average

expenditure under these three headings of £42,000 p.a. per full-time academic staff member and close to £5000 per student f.t.e. These may be compared with the corresponding figures for biological sciences of £24,000 and £2800 respectively whilst for all subjects the averages are £19,000 and £1740. To bring these figures into correspondence with those in the table above displaying the analysis of MRC expenditure they should be inflated by at least one third.

The differentials between the resources available to members of University Medical Faculties and their colleagues in other Faculties may be even larger than these figures suggest. This is because medical research differs from other scientific research in two important respects; it appeals to a wide spectrum of private donors and foundations and at the clinical level involves patients. Both these differences have financial consequences. It has been estimated that in 1978/9 the universities received in total about £15m from charities for medical research, quite apart from the support given for endowed professorships and the like. Patients who participate in clinical research are most often receiving treatment from the NHS which has therefore to meet extra costs due to special nursing, monitoring, treatment, longer stay, extra equipment and apparatus, technicians, etc. It is inconceivable that the average extra cost to the NHS caused by one whole-time academic clinician could be less than £3500 per annum and hence the total bill to the NHS of the three thousand strong university clinical academic staff could not be less than £10m and might be very considerably more. This sum is not a net detriment to the NHS which often receives in return in the form of medical knowledge and care, benefits which though financially incommensurable, must be large. What all this arithmetic means is that on average 4300 pre-clinical and clinical staff (but excluding clinical dental staff) now (1980/1) each cost in their salaries and those of their helpers together with other departmental expenses the UGC and NHS combined at least £63,000 p.a., close to twice that of their biological sciences

colleagues. At the same time they enjoy a more favourable staff/student ratio. Indeed, relative to any other section of a university the medical faculty cannot be described as deprived but privileged and in part this is due to the protection afforded to them by the University Grants Committee and their parent universities in the period 1973–8.

The fraction of this per capita average cost which can be attributed to research can only be guessed because of the imprecision of estimates of the proportion of the time these staff members and their assistants devote exclusively to that activity. However the conclusion is inescapable that during the past decade university medical research has fared better than that in other fields in terms of money per capita devoted to it. But this does *not* mean that in absolute terms there has been an improvement. In fact the contrary is the case. There are several reasons for this. Firstly, the UGC equipment grants to universities over the last seven years have been significantly less than those needed. Table 5 shows the annual values of the equipment grant since the year 1972/3 at constant prices and, in the opinion of those best qualified to judge, the grant for 1973/4 was at about the right level to meet obsolescence and maintain 'well-found' laboratories for a student population of 255,000.[13]

Table 5. UGC Equipment Grant at June 1980 prices (£m).

Year	72/3	73/4	74/5	75/6	76/7	77/8	78/9	79/80	80/1
Value	68·8	73·0	34·2	57·4	33·4	39·0	40·1	45·1	60·8

Since that year the student load has increased by 21 per cent but the equipment grant has never returned to the level of that year and the accumulated deficit over the subsequent years exceeds £200m which is a measure of the extent to which university laboratories have fallen below the 'well-found' condition. This is a most serious handicap to those

striving to produce work of high quality in experimental science where the best work annihilates the good and the second-rate work is often not worth doing. Moreover, in the last decade, other faculties have begun to increase markedly their demands for equipment for research and 'sophistication' of apparatus adds to its cost and frequently also attracts costly contracts for maintenance. In short, a larger research community needing steadily increasing sums per capita for equipment has had to cope with shrinking funds and the result has been very damaging to the quantity and quality of research accomplished. Secondly, the unit of resource, defined as the income from the UGC grant and student fees minus the cost of rates all divided by the student load, has declined by more than 10 per cent in real terms.[7] This decline was not compensated to any significant degree by economies of scale and its effect has been to detract from the ability of the universities to provide well-found laboratories able to accept and use to the full grants from the other side of the dual support system.

Alarming as these facts and their effects are, they hide an even more damaging and insidious phenomenon, which may be described in the following terms. When in 1974/5, with inflation of prices running at 29·4 per cent, the unit of resource and the equipment grant were cut drastically and at short notice, universities embarked on the only quick-acting method of savings which they could adopt, i.e., by reducing the levels of heating, lighting, and maintenance of buildings, stopping purchases of consumable goods, diminishing library acquisitions, 'freezing', i.e. not filling posts that became vacant. All these savings were non-repeatable and, indeed, some later relaxation of certain embargos, for example, on the purchase of consumables was inevitable if universities were to function at all. In the nature of things the freezing of posts rendered vacant by retirement or death created a mal-distribution of staff between subjects in ways unrelated to teaching load and needs and therefore this, too, had to be relaxed if adequate coverage of subject specialties was to be preserved. Therefore, the universities were

singularly ill-placed to face the two further rounds of cuts of the early eighties. The first, based on the overseas students fees policy announced in 1979 and which required 'full' economic feeds to be paid by non-UK or EEC students, has led to the diminution of the number of overseas students who are deflected to other countries only too pleased to receive them. The second cut, announced in December 1980 and referred to as a 'volume' cut, was based on a policy of overall reduction in the size of the United Kingdom university system. By definition no non-repeatable savings were to be found to soften the impact of these cuts and staff had to be induced to leave university service by favourable terms for 'premature, voluntary (*sic!*) retirement' under a scheme costing the Exchequer many millions of pounds. The effects were predictable. Faced by heavier teaching loads but motivated by an ingrained professional ethos which made them feel an inescapable first commitment to their students, academic staff diminished their time for research and scholarship for the support of which the resources in departmental expenditure, technicians help, equipment, journals in libraries, and other central services were shrinking. No wonder morale sank.

As already described, medical faculties were in some degree shielded from the first round of cuts but they were only partially protected from the second round, and the effects of this are even more damaging in clinical medicine than in any other university activity. This is because clinicians have obligations to their patients and, therefore, also to the National Health Service; duties which cannot be evaded. The damage has been particularly severe in postgraduate medical schools like the Royal Postgraduate Medical School and the London School of Hygiene and Tropical Medicine and some of the thirteen Institutes of the University of London which comprise the British Postgraduate Medical Federation. These schools which used to attract large numbers of overseas students many of whom are now deterred by the large fee (£10,000 per annum in 1982/3) are therefore suffering not only from the volume

cuts but from the absence of many of the fee paying overseas students which drastically reduces their income still further. That these difficulties should arise at a time when the output of medical graduates of high quality is rising is especially frustrating, because each year there emerge larger cadres of medical graduates, able and willing to make, through research, distinguished contributions to future medical practice but many of whom will be denied the opportunity to do so. Whether the United Kingdom can maintain its position in the citation indices shown in Fig. 1 is increasingly doubtful.

> No man is an island, entire of itself,
> Every man is a piece of the Continent, a part of the main.

In these words, John Donne expressed the interdependence of human beings. The same could be written of a medical school sandwiched between its parent university and the District Health Authority for each of which it executes necessary functions and from each of which it needs resources in money or in kind. If its university resources are suddenly reduced then, as explained, the patient care which academic clinicians can provide deteriorates and it could be accused of not fulfilling its part of the 'knock for knock' agreement with the NHS. If, in order to keep its part of this bargain, it seeks specially favourable treatment from its parent university in the allocation of resources it is likely to get a somewhat dusty answer and deepen the resentment of those in other Faculties, a resentment which had its seeds in the financial protection given to medical schools in the seventies. Colleagues are apt to raise the question of whether the other disciplines are having to pay too high a price to maintain the relationship with the local Health Authority. We can only conjecture that when government insisted on the 'volume' cuts in university incomes it either foresaw but ignored or failed to recognize the important repercussive effects on the NHS and the growth of medical student numbers to which it and its predecessors had in the past repeatedly affirmed a commitment. In either event the

present situation highlights the need for closer understanding at all levels between the university 'system' and the NHS, a point to which consideration will be given in the final chapter. As a prelude to that discussion it is necessary first to give a brief account of the National Health Service.

5

The National Health Service

ORIGINS

Addison's part in the creation of the Ministry of Health and in facilitating the passage in 1911 of the Act of Parliament which brought the compulsory health insurance scheme into being for employed persons has already been described. Until 1948, whilst this Act remained in force, employed persons who earned less than £420 per annum received, without payment of fee, medical care from a general practitioner of their own choice to whom a payment was made out of the Health Insurance Fund. Almost 20 million people benefitted under this scheme. Their children, if still at school, received periodical medical examination at school and were eligible for free medical, dental, and ophthalmological care but the frequency and effectiveness of the 'school inspections' varied widely, depending on the resources which different local authorities could apply to this part of their responsibilities. Roughly as many people were excluded from the health insurance scheme and, although some belonged to voluntary schemes operated by approved friendly societies, there were many people, uncovered by insurance of any kind, who could not afford the fees of the doctor or the cost of medication. When they were ill the best they could hope for was that the casualty department of the local voluntary hospital or some charitable organization would give them whatever attention could be afforded. If those who were insured nationally were judged by their 'panel' doctor to be in need of specialist help he would refer his patients to a local specialist who would see him either in his consulting room in return for a fee or in his clinic at the local voluntary hospital at which the specialist was a member of the staff, often unpaid, and might also be

Notes and references begin on p. 164.

engaged in the teaching of students for which he would receive at most a token fee from the university. The author has vivid recollections of this kind of medical care as it affected a poor family in the 1920s; memories of an extremely conscientious 'panel' family doctor who was meticulous in both appearance and his domiciliary visits; of tedious hours spent on hard benches in the cavernous waiting room of the Sheffield Royal Infirmary before seeing a surgeon or the x-ray department (with its unshielded x-ray tube!) when he had a broken arm or an ophthalmologist viewing the retina illuminated by the light reflected from a batswing gas burner behind the patient's head. Most of all, he recalls the looks on the faces of the other patients which displayed to various degrees anxiety, stoicism, hope, resignation and that peculiar baffled, almost animalistic passive willingness to accept whatever treatment was provided without asking questions of the trusted members of the health professions who were in attendance. Most depressing was the sense that human dignity had been diminished if not removed; a fault not so much of the hard-pressed nurses and doctors but of the system which cast the patient in the role of a supplicant for charity rather than the rightful recipient of health care. No more cheerful was the experience of visiting an in-patient, when the visitors, already marshalled in the waiting room, were admitted to the wards in the specified numbers at the precise time, announced by the ringing of the bell, and equally promptly asked to leave at the exact minute.

Just after the Second World War there were almost half a million hospital beds of which a fifth were in voluntary hospitals which were, somewhat precariously, supported financially by charities, private and institutional gifts, and sometimes voluntary pro-rata levies on the incomes of those employed in the region served by the hospital such as the 'penny in the pound scheme' in Sheffield. These hospitals also charged fees from those they judged able to pay. Most of the other hospitals were owned by local authorities and had either been initially built for those authorities or taken over

by them in 1929 when the Poor Law Institutions ceased to be the responsibility of their Guardians, but they often retained something of the 'workhouse' atmosphere and ethos. To these hospitals went long-stay patients (mentally or chronically ill, the old, and the dying) and those suffering from certain communicable diseases who were kept in 'isolation' hospitals and yet others were sanatoria. Home care from nurses, health visitors, and social workers was varied and often scanty and provided by a whole variety of organizations including local authorities, hospitals, or voluntary services and the same was often true of transport by ambulance.

With such fragmented responsibility it was only to be expected that the availability and quality of health care varied enormously depending on where a person lived, on income, on the attitudes of local authorities to their responsibilities, and, in particular, on the availability of doctors, whose geographical distribution and accessibility reflected the residential density of the more affluent citizens. Fortunately there were some leading personalities in the country who were concerned about these inequities and who thought in terms of the 'rights' of individuals to education, health care, full employment or if that were not possible, unemployment pay, and other social services. The notions which they advocated were essentially the ideology of the Welfare State, were cogently expounded in the Beveridge Report[1] and, in respect of health care, found their political champion in the eloquent Aneurin Bevan MP who, being Welsh, came from that part of the United Kingdom least well provided with hospitals. The Act of Parliament establishing the National Health Service was passed in 1946. Those who were alive at the time, whatever their own attitude to this Bill could testify to a widespread feeling that only by the means provided in the Bill would standards of health care be improved and keep pace with what medical research would make possible, that access to that care would be made more equitable by making the service free-of-charge when it was delivered and more evenly geographi-

cally distributed. Addison had to steer the Bill through the House of Lords and this must have been for him the satisfying culmination of his life's work. He did so with enthusiasm and success and was warmly thanked for so doing by Bevan.

A lot of preparatory work had to be accomplished before the 8 July 1948 which is generally regarded as the inaugural day of the National Health Service because that was when the hospitals came into public ownership. The 2652 hospitals in England and Wales then became the responsibility of 388 management committees, grouped under 14 Regional Hospital Boards whilst the 36 teaching hospitals came under Boards of Governors which had direct access to the Ministry of Health. Somewhat similar arrangements applied in Scotland. It immediately became possible for each Regional Hospital Board to establish whole- or part-time consultant posts and then to move towards an improved distribution of specialist skills throughout its region. At the same time the Local Executive Councils, 138 in all, were established as the bodies to which general practitioners contracted their services and to which they had to apply for permission to set up in general practice so that these committees were in a position to rectify in some degree the maldistribution of general practitioners, to prevent various abuses and to encourage group practice. The remaining services such as public health, home nursing and visiting, domiciliary midwifery, and home helps were left in the hands of local authorities which, however, were reimbursed by the government for half the cost of providing these services.

THE EVOLUTION OF THE HEALTH SERVICE

The first ten years were very much a 'learning phase' for the National Health Service which at its inception lacked so many data basic to the rational planning of the service to meet the objectives laid down in the Act of Parliament and which had inherited many hospitals which were quite

obsolete and needed rebuilding, others which were unsuitable but could be improved and only a few which reached desirable standards. There were no reliable data as to the true total cost of hospitals and the services they provided and no measures of the effectiveness with which the hospitals operated; health economics had hardly emerged as a subject. But even had they been available, some of the data needed for planning purposes would have been shown to be subject to rapid change. Under the impact of recently discovered drugs the need for prolonged treatment and beds for patients with poliomyelitis, tuberculosis, and other diseases was rapidly declining, surgical and maternity cases stayed in hospital for shorter periods, only the need for facilities for the mentally ill remained high and invariant and that for the aged was increasing. In addition organizational defects were becoming clear; the complaints of the general practitioners about their inability to practice medicine because their time was taken up by form-filling was no doubt an exaggeration but was sufficiently real that, combined with the lure of higher salaries in the United States of America and Canada, some of them were drawn to the greener, lusher, pastures of those countries. It was also obvious that the community services administered by the local authorities must be better co-ordinated and preferably jointly administered with the NHS if a proper balance between these forms of health care was to be obtained. There were financial problems because more people were being treated and, as that treatment became more sophisticated, so the costs rose. There was better access to medical care and the improved health of the nation was beginning to show in the medical statistics but so it was in other countries and, on the negative side, little progress had been made towards a more even distribution of health care availability. At a time in the mid-fifties when doctors were emigrating the Willink Report[2] mistakenly concluded that Britain was over-producing doctors and, as already explained, its recommendations had the effect of depressing the intake into medical schools both in quantity and quality so that the

NHS had to rely increasingly on immigrant doctors to fill the junior posts.

Something had to be done to deal with these problems. By the mid-sixties a hospital building plan was underway; Willink was being reversed with the establishment of new medical schools and the enlargement of others; measures were being taken, through pay, the attachment of paraclinical staff, help with practice expenses, etc, greatly to improve the lot of the general practitioners who were increasingly coming to work together in group practices. A paradoxical concomitant if not an outcome, of examining the need for and the costs of providing new hospitals was the recognition of the illogicality of allocating to Regional Hospital Boards additional subventions from the Department to meet their revenue costs of new hospitals whereas, in fact, the revenue which a Regional Hospital Board received ought to be related to the needs of the population it serves. As the defects were recognized so moves were made to try to eliminate them but the basic weakness could not be disguised that a comprehensive health service was unrealizable unless those services provided by local authorities were properly integrated with those provided by the NHS. Many of these issues were highlighted when a new Medical School at Nottingham University was in its gestatory period and, one particular problem emerged which called into question the desirability of administering those hospitals necessary for teaching independently of the Regional Hospital Board. It was clear that a Medical School with an intake planned to rise ultimately to 192 students per annum would, for reasons of size alone quite apart from the educational advantage, have to send its students into 'ordinary' hospitals in the region where the patient clientèle would be determined more by service than educational needs. The solution was therefore that the group of hospitals, including the new 'University' hospitals each one of which would have a significant student presence should be the responsibility not of a Board of Governors detached from the region but of a Hospital Management Committee within the

Regional Hospital Board. That Hospital Management Committee would receive its resources from the Regional Board, but because of the importance of the medical, teaching, and research activities two-fifths of the members of the Hospital Management Committee were to be nominated by the university.[3]

In the later sixties the tide of official and Ministerial opinion was beginning to flow strongly in favour of transferring to the health service those health care facilities still anomalously administered by local authorities. A Green Paper[4] was issued in 1968 by the Secretaries of State for Social Services and the Welsh Office detailing how this transfer might take place and recommending that the unified service should be administered by up to fifty Area Boards. Two demarcation problems immediately obscured the discussion and this confusion was intensified by the Seebohm Committee's Report on Personal Social Services[5] which appeared in the same year and the Report of the Royal Commission on Local Government[6] which appeared the following year. The first demarcation dispute was over what personal social services should properly be the responsibility of the National Health Service and what should be retained by the local authority. Obviously the latter should administer personal services like 'meals on wheels' supplied to the infirm but otherwise healthy citizens living at home; but should the Medical Officer of Health, or Community Physician as he was increasingly known, be answerable to the NHS or to the local authority? Seebohm and the Green Paper differed on this. The other demarcation issue was whether the geographical boundaries of the Area Boards should coincide with those of the local authorities, i.e., whether 'coterminosity' should be accepted as a principle before the Royal Commission on Local Government had reported and government decisions taken on it rather than basing the areas on rational groupings of hospitals and patient flows which were often across local administrative boundaries.

When the dynamic and opinionated Mr Crossman

became Secretary of State for Social Services he soon announced government decisions on these matters. There were to be Area Health Authorities responsible for all health care excluding community care for the mentally ill and handicapped and for the home help service which as Seebohm had recommended were to be retained by the Local Authority. On average each Area Health Authority would be responsible for about half a million population and several districts which in most cases in the provinces were to be coterminous with the local authority areas. The Regional Hospital Boards were to disappear and in their place were to be constituted Regional Health Councils whose function was to advise the Secretary of State on the hospitals and specialist services. The real workhorse of the new scheme was to be the Area Health Authority, directly answerable to the Secretary of State; to be the employing authority and to do such strategic planning as necessary as well as being responsible for day-to-day management. Membership of the AHA was to be nicely balanced with one-third and the Chairman to be appointed by the Secretary of State, one-third appointed by local authorities and one-third by the health professions and, where there was more than one District in an Area, the Chairman and half the membership of the District Committee would be also members of the Area Authority.

Before this scheme could be implemented there was an election in June 1970 and the new Secretary of State, Sir Keith Joseph and his colleagues the Secretaries of State for Scotland and Wales, after issuing a consultative document[7] and receiving evidence from management consultants, announced a reorganization of the National Health Service. The relevant White Papers appeared for Scotland in 1971 and for England and Wales in 1972.[8] Following the enactment of the necessary legislation the new reorganized National Health Service duly came into being on the 1 April 1974, a date which did not escape comment. The new arrangements brought to the National Health Service many of the responsibilities for health care previously adminis-

tered by local authorities such as the family practitioner committees and in England provided for three tiers of management below the Secretary of State comprising fourteen Regional Health Authorities (RHAs) with executive powers and answerable to the Secretary of State who appointed the members. To each RHA were responsible one or more Area Health Authorities (AHAs), each of which had its health services grouped into Districts of size conveniently administered by a District team of officers. Wherever possible, but not invariably, the geographical boundaries took account of 'coterminosity' and at the Area level Joint Consultative Committees with the Local Authorities were established, whilst at the District level there were Community Health Councils intended to be a consumer group each entitled to represent publicly or privately the views of local citizens whether as private individuals or elected representatives. The establishment of the Community Health Councils was not meant to detract from the right of individual complainants against the National Health Service who could apply through their MP to a newly established Parliamentary Commissioner (Ombudsman) for investigation of their grievances.

Of particular interest to the universities was the abolition of the Boards of Governors with their right of direct access to the Secretary of State from whom their resources were directly derived and which were responsible for the administration of groups of hospitals in which major undergraduate clinical teaching was undertaken and clinical academic units embedded. Instead of Boards of Governors, areas containing such groups of hospitals were designated Area Health Authority (Teaching) and the university concerned appointed two of the members of the Authority. Provision was also made for a Joint Liaison Committee between the university and the RHA and for similar Liaison Committees at AHA(T) level but there was no provision in the Act requiring the record of the proceedings of these Liaison Committees to be put before the Area or Regional Authorities. In the event, some were and some were not and

the disjunction in the latter case was disadvantageous to universities and the National Health Service alike. Boards of Governors were, however, to be retained for the post graduate teaching hospitals associated with various Institutes of the University of London concerned with particular specialities like ophthalmology (Moorfields Eye Hospital), Psychiatry (the Maudsley Hospital), Neurology (the National Hospital for Nervous Diseases) and so on and this anomaly was the cause of much discussion throughout the second half of the seventies.

The Health Service organizations in Scotland and Wales were broadly similar to those in England except that, with populations approximately one tenth and one twentieth respectively of the size of that in England, they were more akin to English Regions. In Scotland, for example, the Secretary of State for Scotland who is responsible for the Scottish Home and Health Department, was to be advised by the Scottish Health Service Planning Council and directly responsible to him were to be fifteen Health Boards, each advised by a Local Consultative Committee and a Local Health Council and, where appropriate, a University Liaison Committee. Beneath this layer lay the Districts. Wales, with a somewhat different terminology, was to have eight Area Health Authorities and in both countries certain common services were provided by a special agency.

Thus, three quarters of a century after Addison entered Parliament Britain had a unified and comprehensive health service in which family planning, family practice, community and specialist services were all brought together for the first time. The structure distinguished between policy-making (the responsibility of the Regional and Area Health Authorities) and detailed operation at District level into which there was more local input (through the Local Authorities nominees, Community Health Councils, and Liaison Committees). The translation of policy into detailed management was in the hands of Teams of Officers at Regional, Area and District levels. The Secretaries of State for Social Services, Scotland, and Wales were accountable to

Parliament for the performance of the NHS and for the broad policy decisions. They set the guidelines for the Health Authorities and allocated financial resources to the Regions.

The reorganized NHS therefore devolved considerable responsibility to local levels, thereby preserving local participation and the possibility of local initiatives and of responses to locally expressed needs, whilst retaining the power at the centre to move towards a more equitable access to health care, irrespective of a citizen's domicile. Information necessary for decisions at the centre and the periphery could, in principle, at least, flow freely between them in both directions. The hopes that the new arrangements would give general satisfaction were, however, not fulfilled and it became necessary to establish in May 1976 a Royal Commission on the National Health Service 'to consider, in the interests both of the patients and those who work in the National Health Service, the best use of the financial and manpower resources of the National Health Service and the parallel services in Northern Ireland'. The Commission gave its views just over three years later in 380 pages of small type.[9] It is not the purpose of this book to consider the views and recommendations of the Commission except in so far as they relate to medical education and research but there are certain general matters underlying the discontents which have a bearing on the relationship of the universities to the National Health Service which deserve mention. They may be classified as economic, ideological-political, and conceptual.

The reorganized NHS was inaugurated in a year of economic and political upheavals. A sharp increase in the price of oil, augmented by the tendency to global recession, added to the strains in the already ailing British economy which had led to the 'dash for growth' being transformed into 'galloping' inflation of 30 per cent in that year. Wage demands soared, the miners went on strike and the government fell, having had to begin to restrict public expenditure to cope with mounting inflation. The new

government had to maintain these curbs though with different emphases. The hospital building programmes were also curtailed. Therefore, what would have been an easy operation in more affluent times, namely, to add resources to deprived Regions of the National Health Service in order to achieve the much-desired equality of access to health care became impossible. Instead, any step in the direction of equalization of provision based upon the inter-regional comparative studies of the Resource Allocation Working Party[10] and its counterparts in Scotland and Wales inevitably meant a tax on the resources of those areas or regions which were best provided for but which nevertheless needed more. Furthermore, these economic constraints coincided with the increased availability of new and expensive techniques and procedures in diagnosis and treatment. There were also discontents amongst the hospital doctors which stemmed from the low authorized proportion of consultants in the NHS which is referred to later. The junior hospital doctors, concerned about their career prospects because of this low ratio and working long hours, felt themselves exploited and in 1975 went on strike, something unprecedented in medical history and regarded by many as a betrayal of the medical professional ethic. Pressed by the British Medical Association representing the interests of the junior hospital doctors the government gave way and introduced the damaging concept of 'units of medical time' as a basis of computing income for those with clinical care responsibilities. This immediately caused problems for clinical academic medicine and the universities where the prevailing ethos was of professional commitment unrelated to salary and the norm was that work had to be done however long it took if it was necessary for the benefit of one's students or patients. As doctors moved up the income gradient so it became increasingly difficult to recruit medically qualified staff to university anatomy, biochemistry, and physiology departments because they were ineligible for such 'piece work' payments and the proportion of these fell below acceptable or educationally desirable levels.

There were also problems with the much more numerous but less well remunerated hospital ancillary staff.

Sadly there developed an increasing polarization of attitudes. This was not based merely on the inevitable tensions created by the better paid doctors working closely alongside the more lowly paid ancilliaries but was exacerbated by the issue of 'pay beds'. From its inception it had been possible for private patients to occupy beds in NHS hospitals in return for a payment. When Mrs Barbara Castle was Secretary of State for Social Services the government decided that pay beds should be phased out. The ensuing debate intensified the polarization and served merely to distract attention from the real problems of the National Health Service. Because the proportion of pay beds had been steadily declining as the whole-time medical staff had increased the wisest course was clearly to so improve the Health Service that the demand for these beds would disappear and the problem 'wither on the vine'. Ironically her decision gave a tremendous fillip to the commercial operators of private hospitals and private health insurance schemes. Again, as far as is known for purely ideological reasons, Mrs Castle increased the proportion of Area Health Authority members drawn from the Local Authorities.

The reorganized NHS could in these respects be faulted on conceptual grounds. The first was concerned with structure and the second with management style. The differences between Regions in respect of resources and the distribution of socio-economic groups in the population they served were on average sufficiently great to justify organizational separation and each Region had a sufficiently large annual quantum of resources to enable it to engage in strategic planning and to alter the disposition of these resources to the different parts of the region according to need. At the other end of the size spectrum the Districts were each small and homogeneous enough to exemplify particular needs and problems of which the major ones could not be remedied from their own resources. The Districts being 'at the coal face' were therefore well placed

to be locally responsive and to send messages upwards about the practicalities of running a health service. What the Districts could have provided collectively could have been invaluable to the Regional Health Authorities in their policy role. Without the analysis of the data and the consideration of the opinions based on experience which the Districts could provide the discussions of the RHAs could easily become too detached, too theoretical, and lacking in a sense of the practical. The intermediate Area level had the virtues and advantages of neither the District nor the Region. It was simply an unnecessary intermediate layer of variable permeability with the tendency of all bureaucratic structures of questionable real function to invent work for itself and to emphasize its importance by providing a non-ignorable impedance to the flow of ideas and information.

The second misconception is associated with the Management teams which existed at District, Area, and Regional level and generally consisted of a Medical Officer (often at Regional level the old Regional Hospital Board Senior Administrative Medical Officer and at the Area level a Community Physician who had been a Medical Officer of Health employed by the Local Authority before the reorganization) an administrator, a finance officer, a buildings officer, and the appropriately ranked nursing officer, each of whom was head of his or her own staff. The style of management was supposed to be 'consensus management', that is to say, that through discussions the team of officers would translate decisions of their Authority into tasks for themselves and their staffs which, if properly carried out, would lead to results in accordance with the Authority's wishes. The weakness of this arrangement is obvious. No single person was responsible to the Authority for any task which involved more than one department and since many of the decisions required for their implementation action from several departments, voluntary consensus management, especially in times of financial restraint, could only be achieved by those of angelic disposition, prepared to co-operate to the full, to give and take, and to subordinate

the claims of their own departments completely to the common interests and the career prospects of their staff to the common good. Humans rarely have these qualities and it is not surprising that in the absence of explicit instruction about Chairmanship even that could, and did, become an issue dividing many teams of officers. Another significant obstacle to efficient administration derives from the concept of a chain of responsibility in which each person in a particular category was responsible solely to the Chief Officer in that category. In practice members of different categories such as porters, cleaners, nurses, and doctors needed to work together co-operatively in wards or operating theatres for the benefit of patients. The standard of work of the cleaners, porters, and nurses must always be satisfactory in the judgement of the person who carries the ultimate responsibility, i.e. the physician or surgeon. But the administrative arrangements made it well-nigh impossible for the medical staff to control, say, the cleaning staff directly. Thus, if the shower in the operating theatre suite was judged by a surgeon to be insufficiently clean the cleaner responsible could not be admonished or instructed to carry the work out properly by the surgeon. Instead a complaint of this kind had to go up the chain to the Team of Officers and come down through the proper channel sometimes only after it had been discussed by the Team of Officers. This kind of arrangement is the natural enemy of taut management, high morale, and high standards and offers ample opportunity for industrial dispute. These have occurred in hospitals when, in a desire to get their work completed quickly and well, professional staff have reproached directly non-professional staff who are under an independent command.

What is lacking in the existing management structure is a *Chief Executive* answerable to the Authority for the efficiency of the day-to-day operations and ensuring that these are in accordance with the Authority's policies. The members of the existing Team of Officers would each be responsible to him for the satisfactory performance of an assigned

function. In order to avoid the type of situation described in the preceding paragraph the Chief Executive would make it absolutely clear that for some health care purposes particular staff of individual Officers would be detached to serve in a multi-disciplinary team under the control of some designated professional to whom they would be immediately answerable for the efficient performance of the duties assigned to them by him. Such greater immediacy of responsibility will ensure that both good work and 'covering up' of bad work will not go unnoticed; that advice, help, praise, or admonition can be given promptly when necessary and that the performance and sense of pride in work by individuals can be enhanced. If, as at present, administration lacks this, if there is a vagueness about responsibility, if supervision is too remote and corrective action or encouragement long delayed then management becomes slack and flabby, the service given less efficient and productive and therefore more costly and the morale of staff declines. A Chief Executive given powers to administer flexibly and solely accountable to the Authority can do much to raise the 'tone' of his organization to a level which 'consensus management' as now practised is unlikely to achieve.

THE DOCTOR IN THE HEALTH SERVICE

No event in this century has changed the life of the British doctor more than the establishment of the National Health Service and the subsequent modifications of that service. At the time of writing another reorganization involving the abolition of the Area Health Authorities and the creation of District Health Authorities has occurred. Because it is too early to assess the impact of this last change and because it post-dates the most recent statistics which are needed for the discussion below, it will be disregarded except to comment that it seems unlikely to cause any major perturbation of the doctor's role.

There are close to one hundred thousand medical graduates in Britain of whom some 17 per cent no longer

practice medicine having either retired or moved into posts where practice is not required. Of the remainder about 7500 are employed in industry, Her Majesty's forces or other organizations or are self-employed in private practice. The full-time academic staff in medicine of British universities numbered 4306 in 1980/1, but not all these were medically qualified. Some other doctors are employed in public services such as the School Medical Service and about 65,000 work within the National Health Service in Great Britain. All except the 1·3 per cent who are community physicians and their staff are either general practitioners or hospital doctors. As Table 6 shows they are far from being uniformly distributed throughout Great Britain; Scotland and the North-West Thames Region have the highest ratio of doctors to population, close to 1·35 per thousand which is approximately 40 per cent larger than the average for South Yorkshire, Derbyshire, Nottinghamshire, Lincolnshire, and Leicestershire combined. Some of the factors which have led to this geographical variation of the quotient are understood. Doctors frequently stay to work in the Region in which they went through medical School so that Scotland with five undergraduate medical Schools and London with twelve undergraduate Medical Schools, many postgraduate Medical Institutes, the Clinical Research Centre, and the National Institute of Medical Research would be expected to have larger quotients than the remainder of the country. Furthermore, the seventies saw a large decrease in the residential population of the more central parts of large cities due to migration, often to satellite towns. London and Glasgow were particularly affected by this change.

Most young doctors make their choice between general practice or work as a hospital doctor during their late twenties. From whatever university a young person graduates in medicine the choices open to him or her will be the same. He or she must first spend one year as a House Officer in a hospital working as an apprentice in medicine and surgery before the General Medical Council will enter his or

Table 6. GPs and Hospital Doctors per 10,000 population in 1977.[11]

Region	*GPs*	*Hospital doctors*	*Total*
Northern	4·55	6·22	10·77
Yorkshire	4·70	5·62	10·32
Trent	4·54	5·14	9·68
East Anglia	4·85	5·71	10·56
N.W. Thames	5·48	7·84	13·32
N.E. Thames	5·10	7·40	12·50
S.E. Thames	5·01	6·85	11·86
S.W. Thames	5·17	6·25	11·42
Wessex	4·98	5·45	10·43
Oxford	4·75	6·04	10·79
S. Western	5·17	5·32	10·49
W. Midlands	4·56	5·45	10·01
Mersey	4·60	6·13	10·73
N. Western	4·55	6·59	11·14
ENGLAND	4·84	6·13	10·97
WALES	5·05	5·96	11·01
SCOTLAND	5·56	7·84	13·40

her name on the Medical Register, thereby conferring a legal right to practice medicine, though for some years this must be exercised under supervision. It is typically the case that the newly registered doctor will spend one, two, or even three years in Senior House Officer appointments in a NHS hospital whilst deciding what specialty to enter. If general practice is the choice the doctor will then move to an approved general practice, to a Principal of which he will be assigned as a Trainee and he will spend specified periods in the practice and in hospitals, such as maternity hospitals, which deal with those 'client groups' of patients who frequently present themselves to general practitioners. Satisfactory completion of this course qualifies the doctor to be a partner in a general practice. If, on the other hand, the choice is for any other specialty except community medicine, the aspirant will seek a Registrar post in the appropriate department of a hospital when he or she will be assigned to a 'firm' headed by a consultant. The doctor-in-training will then expect to spend six to eight years first as a

Registrar and later as a Senior Registrar, during which he or she will not only be 'learning by doing' but also studying for those examinations conducted by the Royal College or Faculty which awards the desired higher qualification in the chosen specialty. Thereafter he or she will try to obtain a Consultant post and thus move into the position of carrying the ultimate clinical responsibility for the care of his patients. The Fourth Report of the House of Commons Select Committee on Social Services[12] published a diagram showing the medical career structure. This is reproduced below and the figures in the boxes denote the number of whole-time equivalents in post in September 1979.

Compared with the United States of America, Canada, the Scandinavian countries, and Scotland which have roughly one doctor per 600 population, England and Wales together have an average of one doctor per 750 of the population. Some would use this kind of statistical information as an argument for adding to the stock of doctors in England and Wales. It would be fallacious to do so if only because, judged by such measures as standard mortality rates or incidence of chronic illness, it is not the case that the people of Scotland are on average proportionately healthier than those of, say, the Trent region which has 30 per cent less doctors per head of population. Other factors influence the level of health such as per capita income, quality of housing, and level of unemployment. The real questions are whether health care is easily accessible to the population and is of good quality and these in turn depend upon the availability and quality of the doctor of first contact, his ability to secure a specialist and hospital services of good quality or domiciliary care. Whilst acknowledging some of the weaknesses of current medical education referred to in chapter 4, there is still good reason to believe that British university graduates produced in the last ten to fifteen years have been of high intellectual quality, well motivated, and educated. On the world market their qualities are appreciated and they are sought after. To derive the maximum public advantage from these doctors their skills must be

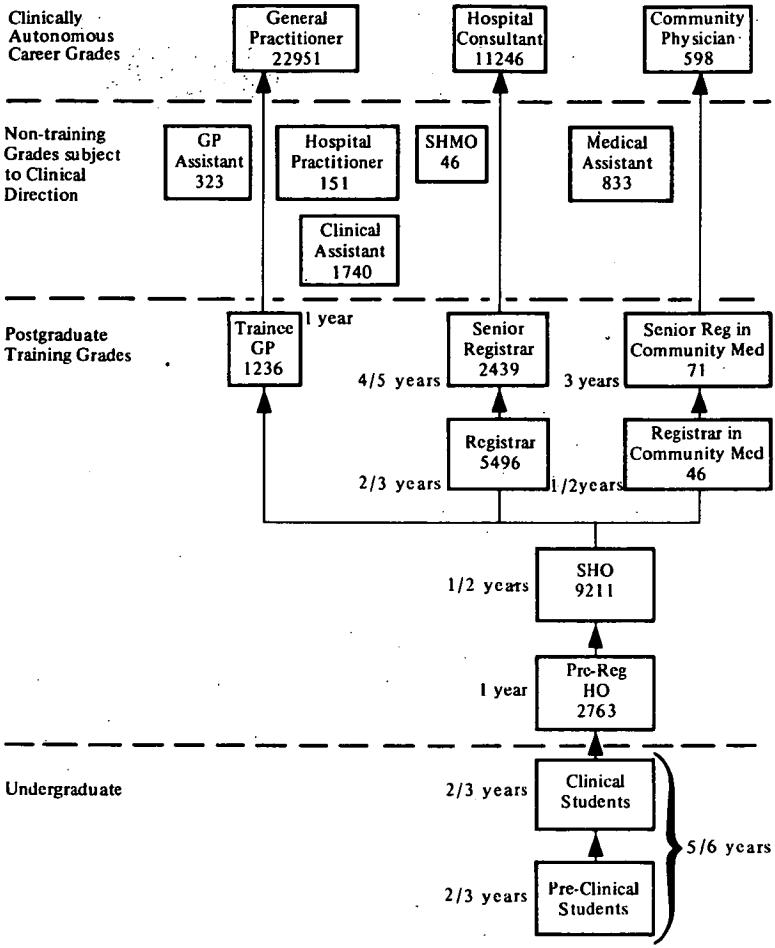

FIG. 3. The medical career structure.

brought to the highest level by proper postgraduate training and education and then so deployed as to maximize the benefits to the various patient groups.

At this point it is necessary to return to the statistics and to decide, in principle, how to deal with those doctors who may perform more than one function, such as those

consultants who hold part-time contracts and those general practitioners who also work part-time as clinical assistants or hospital practitioners in hospitals. For consistency and to avoid double counting of single individuals the Select Committee employed the concept of *whole-time equivalent.* Adopting this principle the total number of doctors on the Medical Register working for the National Health Service in England and Wales can be sub-divided as shown in Table 7.

Table 7. Doctors in the National Health Service in 1979 in England and Wales.[13]

Category	*Grade*	*Numbers*	*Per cent*	*Per cent*
Hospitals	Consultants—autonomous	11,246	19·9	55·2
	Subject to Direction—non-training	2,794	4·95	
	Subject to Direction—training	17,146	30·4	
General practice	Autonomous—principals	22,951	40·7	43·5
	Non-autonomous assistants	323	0·6	
	Trainees	1,236	2·2	
Community medicine	Physicians	598	1·1	1·3
	Registrars	117	0·2	
Total		56,411	100·0	100·0

Note: Whole-time equivalents throughout.

The proportions for Scotland are very similar. Compared with the United States of America where there is no National Health Service, Britain uses its doctors very differently in two important ways. Although, as we have seen, the ratio of active doctors to population are not so very different (1 to 600 and 1 to 750 in the USA and Britain respectively) there are proportionately far fewer in general practice in the USA. For example, in 1973 the percentage of active doctors in general practice in the USA was estimated to be only 19 per cent and a continuation of the trends then prevailing would have brought this figure to less than 15 per cent by 1979, compared with the percentage shown in Table 2 for England and Wales of 43·5 per cent. Secondly, but also in 1973, there were 280,000 specialists in the United States of America. This means that in that country

there is about one specialist per 900 population and one general practitioner for 4 to 6000 population, whereas the corresponding ratios for Britain are 1 to 4500 and 1 to 2000 respectively. Of course, international statistical comparisons are notoriously misleading, often because of terminological differences in the categories used for classification but the disparity in the figures just given are so gross that it is difficult to escape the conclusion that there are, indeed, more general practitioners and fewer specialists per million of the population in Britain as compared with the USA and this conclusion receives some support from the fact that a significant proportion of those receiving care in hospitals in the United States are self-admitted, i.e. feeling unwell and lacking a personal physician they sought help from the nearest hospital which would accept them. Furthermore, many British families who have lived in the United States will confirm the difficulty of finding a local general practitioner, that domiciliary visits are extremely difficult to secure and, in short, have felt the lack of someone who will act as a general counsellor to the whole family, treating its members wherever that lies within his power and, if necessary and after preliminary diagnosis, sending a patient to the appropriate specialist. The author has had this experience and also that of seeking help from a group practice where, having been given little opportunity to describe those symptoms of malaise which gave him concern, he was quickly launched into a series of tests, many obviously irrelevant to his condition. A sight of a badly shielded diagnostic x-ray set and a soft x-ray tube for skin irradiation (used, so he was told, for scalp conditions!) were enough for the then Chairman of the Association for Radiation Research and future Chairman of the National Radiological Protection Board to make his escape and hope that Nature's repair mechanisms would work in his favour, as happily they did! It may be concluded that, both in terms of number and quality of general practitioners, the British public enjoys a much higher level of primary care and that general practitioners in Britain find their career rewarding

in personal as well as in financial terms. Indeed, a distinguished American physician, Dr Paul Beeson, who was Nuffield Clinical Professor of Medicine at Oxford from 1965 to 1973, wrote an article in the *Journal of Medical Education* in January 1974:

> Incomes have been brought up to a range similar to that of hospital consultants. Funds have been made available for equipping and staffing of offices. The formation of group practices has been encouraged and many so-called health centres have been built. These are places in which small groups of general practitioners work together. Public health nurses and social workers have been provided. Laboratory services for general practitioners have been established. Those graduate teaching centres, now over 200 in number, have been located all over the country. These are equipped with lounges, seminar rooms and libraries and GPs receive payment for attendance at post-graduate instruction.[14]

He adds that, in his judgement, many of those who become general practitioners in Britain are of the highest quality 'who could undoubtedly survive the competition for good consultant posts'. Welcome as these plaudits of an unbiassed, knowledgeable, foreign observer are, it must not be forgotten that there are yet many defects in the NHS remaining to be remedied; not least the mal-distribution of general practitioners which still deprives those who live in less desirable neighbourhoods from the high quality of family doctor service which they need.

The same foreign observer also expresses the opinion that, apart from that restriction on where they work which is determined by the geographical distribution of the posts to be filled, the British consultants are well satisfied with their jobs. Although, on average, they earn much less than their American counterparts, they do not have to face the costs of clerical and other help, the purchase or rent of consulting rooms, the financing whilst they work of the pensions they hope to receive on retirement, or the immense annual premia which have to be paid for insurance against the expenses incurred in defending suits for medical negligence or mal-practice instituted by litigious disgruntled

patients. As Professor Beeson writes 'each (British consultant) has security and a good deal of autonomy—his own beds in the hospital, his own team of nurses and junior doctors. The patients he sees have been screened so that comparatively little of his time is spent inappropriately'. Yet five years later the Royal Commission on the National Health Service was commenting on the low morale amongst the hospital doctors in that service.[9] Much of that decline in satisfaction amongst the consultants stemmed from the disturbing effects of the 1974 reorganization, the new and, in their eyes, less efficient and time-consuming 'consensus' management, a government pay policy that diminished and sometimes reversed the salary differential between themselves and senior registrars and the disappointments of unfulfilled expectations as government expenditure curbs led to the cancellation or deferment of new buildings and of the acquisition of more sophisticated equipment. Perhaps more portentous than the decline in the morale of consultants was that of the junior doctors, Registrars and Senior House Officers, who felt exploited as cheap labour, overworked and underpaid, and with declining prospects of securing a consultant post. There is some truth in these claims. In the year in which Paul Beeson was writing, one year before reorganization, the ratio of junior doctors to consultants was about 5 to 4; five years earlier it was about 6 to 4 and by 1979, six years later, and corresponding to the figures in Table 2, had become 7 to 4. The announcement in 1981 by the then Secretary of State for Social Services that the number of consultants was to be doubled in the next 15 years, i.e. restore the ratio to just under unity, will, when implemented, improve the promotion prospects of the junior doctors, ensure easier access of patients to consultants, and make it possible to augment consultant services in deprived specialities and deprived geographical regions. To extract from this change the maximum benefit in the form of a more efficient system and a greater throughput of patients as well as the avoidance of emergency operations undertaken by junior doctors often at night, capital

expenditure on facilities such as operating theatres is absolutely essential.

The attractions of a profession such as medicine or a vocation like the priesthood are that they give scope for independent, individual judgement, and decision, for personal responsibility for the care of others which frequently evokes a reciprocal appreciation of the effort made on their behalf, for tackling varied and interesting psychological and intellectual problems and for the occupancy of a position in society which is well esteemed. It is, of course, true that these rewards will not be realized unless there is also an open-ended commitment on the part of the doctor to his patient, to do his best for him, however much time and effort this may take. Many doctors were willing to accept this commitment provided that they enjoyed a modestly prosperous way of life. But like all groups in society some doctors have always been avaricious. Recognizing this and also the fact that the opportunities for larger incomes before the National Health Service was established were always greatest for the consultants, Aneurin Bevan, who also saw only too clearly how essential the services of the consultants were to the new health service, made the consultants' terms of service flexible and the remuneration generous. 'Glut them with gold' is the phrase attributed to him in the latter context. Flexibility was facilitated by allowing the consultant to engage in private practice or other activities for X 'notional half days' a week in respect of which the consultant's salary from the National Health Service would be abated by X elevenths of the total, but it was clearly understood that the consultant's commitment to his NHS patient must be complete, that he must respond if in the opinion of his registrar his services were needed at any time of day or night, within or outwith the eleven minus X notional half days for which he was remunerated by the National Health Service. Because the number of consultants did not increase according to need and its annual rate of increase was in fact less than that of the junior hospital doctors over many years, more of the consultants' work had

to be delegated to their younger colleagues in the training grades. This had the effect, it is claimed,[12] that 30 per cent of junior doctors in 1980 worked 104 or more hours a week and a further 40 per cent about 90 hours per week. Exaggerated as these figures, which include time 'on-call', undoubtedly are, the fact cannot be disguised that many junior doctors were fatigued to a point detrimental to their own studies and possibly to the care of their patients.

In the early seventies two pressures were intensifying which were to erode the notion of a fixed salary in return for which a full-professional commitment would be expected. Both these pressures were directed towards making the remuneration more 'work-load sensitive', to use the jargon of the day. That pressure from the junior doctors was aimed to achieve a recompense for long hours worked, for deprivation of study-time and to enhance pay as some compensation for their limited and diminishing chances of achieving a consultancy and higher pay. (The average age of first appointment to a consultancy in 1979 was 37·4 years and still rising). That from the consultants sprang from their wish to restore the differential which separated them from Senior Registrars and which had contracted because of government pay policy which permitted lower paid workers' wages to advance whilst the salaries of the higher paid were restrained. In response to these pressures new concepts were introduced such as that of Units of Medical Time (UMTs) and extra-duty allowances. This decision, taken in the mid-1970s could hardly deserve the comment earned by the decision to establish the National Health Service itself, namely, that it 'was the most unsordid act of British social policy'. Not only does this decision weaken the vitally important principle of complete professional commitment irrespective of private gain but it is an incentive to negotiate contracts which enable junior doctors to work excessively long hours. Furthermore, it creates problems for the universities in the recruitment and retention of staff in their faculties of medicine, problems to which we refer in the next chapter.

CONCLUSION

The purpose of this chapter has not been to give a comprehensive account of the National Health Service and its development in the last 30 years or so, but merely to describe the working environment in which the majority of British medical graduates spend or will spend most of their working lives. Many assessments have been made of the effectiveness of the service. One opinion should carry great weight because it has that measure of detachment and lack of bias of someone who spent most of his life in another country and yet has 8 years intimate working knowledge of it. In 1973 Professor Paul Beeson wrote about the NHS that 'it works surprisingly well . . . providing a good standard of medical care for every person without private cost . . . British doctors themselves approve the principle of the service' . . . 'A National Health Service has greater advantage over the free enterprise system in terms of economy and the avoidance of redundancy'. He notes that for a population just over four times as large as the United Kingdom the United States of America spent over fourteen times as much on its 'health industry' and he regards much of this expenditure as wasteful due to unnecessary procedures such as the relentless (and often unnecessary) drive of the diagnostic work-up 'which makes the patient uncomfortable to little purpose' and 'twice as much surgery is done in the US as in Britain'.

This is praise indeed and in these dark days we need to be reminded of it particularly when there are those in this country who, from ideological reasons of left or right, are so eager to demigrate the National Health Service. Those of the right maintain that the Service is bureaucratic and unnecessarily expensive, a charge convincingly rebutted by Professor Beeson's estimates of the comparative costs of health care in the United States and the United Kingdom. The other critics, in company with the respected members of the Royal Commission on the National Health Service[9] and the Reith Lecturer,[15] aver that the NHS has failed

dismally to provide an adequate primary care system because the position of those in socio-economic classes 4 and 5 has worsened relative to those in 1 and 2 so that to quote Dr Kennedy[15] 'Now more than ever, wealthier means healthier'. This statement and those of the Royal Commission overlook the fact that the health of *all* socio-economic groups and their access to health care have improved. It cannot be regarded as a criticism of a Service which is manifestly free and open to all; it is merely another example, like the use of public education and libraries, of the better educated people in the higher socio-economic groups always making greater use than do those in lower groups.

The rebuttal of criticisms so ill-founded as these is easy but it would be idle to pretend that the National Health Service has wholly succeeded in fulfilling the objectives set by its creator, Aneurin Bevan, of making medical treatment and care 'available to rich and poor alike in accordance with medical need and no other criteria' but medical care in this country has moved much closer to this ideal than has been possible in some richer countries and has done so at lower per capita costs. In the course of its development the National Health Service has altered in some important respects which have been described earlier and more changes seem imminent as errors which are either conceptual or caused by external factors, which are often economic in nature, are recognized and steps taken to rectify them. There will always be dissatisfaction with the Service if only because advances in medical knowledge generate opportunities for better treatment and stimulate rising expectations which are not promptly met either because of the time lag inherent in training people and providing the equipment for treatment or because there is not a general will to commit resources to achieving such purposes. But it is quite unfair and illogical to assert that the frequent changes of structure and policy of the National Health Service are evidence of a seriously flawed instrument. On the contrary what is remarkable about the Service is its capacity for adaptation to

changing circumstances, that it can learn from experience and that it constitutes a planning mechanism by which priorities and changes in them can be identified and then steps taken further to improve the Service. In short, the Service has the capacity for successful evolution by small mutations which enable its successful adaptation to changing circumstances. That the Service could do better is beyond question and amongst its weak points are the imperfections of the interface it has with the universities which is the subject of the next and final chapter of this book, in which we shall see that there are faults on both sides.

6

Prospects and problems

LOOKING AHEAD IN WESTERN EUROPE

As Britain enters the last two decades of the twentieth century it faces difficult economic problems which cannot be ignored in any discussion of the prospects for the universities and the National Health Service. The origins and nature of these problems are not hard to find. In the first chapter attention was drawn to natural science, engineering and technology, the products of the human mind, which serve the dual purpose of helping humans to satisfy their curiosity by perceiving their own individual places and roles during their brief earthly lives and of enabling them to use the materials of the earth and energy to improve the conditions of those lives. Science also teaches that these resources are divisible into three categories which may be understood by recognizing that there is life on Planet Earth solely because it daily receives from the sun an amount of radiant energy which shows no sign of diminishing during any conceivable time-frame of interest to the human race. Through photosynthesis some of this energy is used to combine carbon dioxide and water into chemical compounds which form the structures of plant life, a process accompanied by the release of oxygen. Those plants or parts of plants which are used for food by animals, including humans, can be cropped and regenerated at least once a year and sometimes more frequently. With sensible husbandry the potential of the land for this purpose need not be damaged. Plants and particularly trees may be used to construct dwellings which can last long enough for the plants so used to be replaced by new growth, thereby maintaining an equilibrium. Plants and especially wood may also be used for fuel when they use oxygen to generate

Notes and references begin on p. 164.

carbon dioxide and water, in the course of which heat is liberated which mankind has learned to use for cooking, maintaining body temperatures, and transformation into more easily handleable and storable forms of energy as well as for performing mechanical work. If unused in these ways plants die, rot and over very long periods of time are converted through complex, slow, biological, and chemical changes into massive, mainly subterranean, reservoirs of highly carbonaceous solids such as coal or gaseous and liquid hydrocarbons. If the use by Man of these resources either for fuel or as feedstock for manufacturing processes is faster than their rate of natural replacement then the reservoirs must shrink. The estimates of the size of the accessible reserves of these materials have, of course, increased as techniques of exploration and extraction have improved through the application of organized knowledge and this has led some to assume that we may behave as if such reservoirs were unlimited. Others who accept that there are limitations but who are usually unaware of the ineluctable laws of the conservation of mass and energy and of simple theremodynamics, maintain that there will somehow be a neat technological 'fix' which will miraculously enable the depletion of this stock to be postponed or prevented whatever the global demand. In addition to the use of materials of biological origin mankind also needs the inorganic chemical elements, metals and non-metals, the abundance of which in the Earth's crust has been predetermined by cosmic processes and cannot be altered on any relevant time scale by any known or likely-to-be-discovered processes. The only exceptions to this are those transformations of elements achieved in nuclear reactors. But in most cases before they can be used the ores containing these inorganic elements have to be chemically changed and this makes further demands on energy.

The three categories are therefore:

1. Those resources which are unlimited on the human time scale. These are restricted to energies such as solar, gravitational (tidal), climatic (wind and water), gravita-

tional and climatic (waves), geothermal and, less certainly, nuclear.

2. Those resources which are renewed by Nature sufficiently quickly for prudent husbandry to enable stocks to be maintained. Plants used for food and construction are typical examples.

3. Resources, the global stock of which is finite, such as those chemical compounds in the Earth's crust which contain inorganic elements and those the stock of which is in practical terms, finite because the natural regeneration time is geological; examples of this are the fossil fuels, gas, oil, coal, shale and tar sands.

The third group presents the most problems because of the profligate past use of them so that, for example, the cumulative world production of certain elements, notably tin, zinc, lead, and tungston exceeds the best estimates of the world reserve.[1] Clearly care must be taken to recycle these elements when the period of utility of the manufactured products of which they form a part comes to an end. However in some cases this is not possible because the end point of use distributes the elements too widely for recovery as for example, by the escape into the air of particulate oxides of metals from running combustion engines. Despite these problems, which humans have created for themselves as part of the process of achieving other ends previously considered desirable, there is no reason why in the next two decades the capacity of the lithosphere and the biosphere should not supply the material and energy needs of the world's population provided wise policies are adopted. The test of the wisdom of those policies must be that at no time in the future should non-renewable stocks sink so low, or biological mechanisms be so irreversibly damaged, or equilibria so displaced that the human population cannot be sustained.

In the framing of the policies other considerations, some of which have a scientific base, cannot be neglected. They relate to population growth, technology, development and the distribution of natural resources. World population

grows partly because of the general increase in longevity through postponement of death by starvation and disease and partly because of the reluctance of those adults living at subsistence levels to limit the size of their families when it is to their progeny that they look for support in old age. The attitude implicit in the latter can and does change as the standard of living increases and there is ample evidence that in the long term increasing prosperity is the best contraceptive.[2] But during the period in which that two-thirds of the world's population at present in poverty are having their living standards raised to a level at which their birth rate begins to decline there will be a *surge* of demand on resources. There is therefore a race against time in the immediate future to bring the less developed world forward very rapidly and to do this with the minimum waste of resources or the lowering of stocks of non-renewable resources. In this period of development many of these countries will advance their living standards initially through the export of natural resources which they own at the highest prices achievable on the world market and will use their lower labour costs to manufacture more cheaply than more advanced countries goods to be used both by themselves and for export. The large oil price rises of the early 1970s are dramatic examples of the former and although there is talk of a current oil 'glut', never again will oil fall back to its pre-1973 price level.

The advanced nations face extremely difficult problems too. For all manner of reasons they should not obstruct the advance of the developing nations and, in any event, they could only delay (with deleterious effects for the world) and not prevent it. Because in Europe the advanced nations are densely populated and because all material resources except those in the first category are non-uniformly distributed there is much that the European countries must import. Increasingly their traditional economic practice of importing cheap energy and raw materials, adding value to the materials by the manufacture of products to be exported often to less developed countries will be less open to them in

the future. The recent history of the natural and man-made textile industries of the West illustrates this. The problem is further compounded by the fact that science-in-action enables more goods to be produced per man-hour worked with greater per capita demands on resources. On global grounds it might appear sensible for the West to limit its output of manufactures, accepting either high unemployment or a shorter working week, and with these also accept inevitably no improvement and probably a decline in its standard of living. Matters are made more difficult by the realities of international economic competition so that the first Western nation to choose to limit production in traditional industries will enter a downward economic spiral.

This is an extremely gloomy scenario and the purpose of depicting it is to draw attention to the need for co-operation to replace competition between nations, for them to act in concert through groupings of increasing size which adopt policies leading to the prevention of the development of any major disparities of realizable expectations between nations. In the end, of course, there must be some kind of 'planetary bargain' in which the world population is limited to a level which is in equilibrium with the resources and with a more equitable living standard distribution. But this goal will not only take time to be attained but the attainment involves the West making certain major adjustments quickly, adjustments which are possible only because of the lead which is held, through science in knowledge of how things may be done. The West must solve its own problems and contribute to the solution of those of the developing countries by being the innovator. The Cavendish after-dinner toast must be rejected and in its place we must make sure we retain the initiative in the electronic and more sophisticated technology. Less people will be employed in the sheer manual effort of manufacture as this becomes more systematized, automated, and robotized. More people will be involved in the invention of hardware and software and in the initial use of novel processes for manufacture by scientific and

technological means but, as other countries take over these processes and their standards of living and also labour costs rise the West must replace these industries constantly by new ones until a more evenly distributed living standard and stabilized world population are achieved. Some of the exports of the West may not be in hard goods but in important services e.g. educational, medical, civil constructional, social, and other know-how, all of which will have their value and price.

This is the only choice and it has two policy implications. First, as old industries decline there must be massive reinvestment to enable new ones to take their place and, second, it cannot become a reality without a workforce which is highly educated and flexible. Education will need to change to prepare people more for first employment and also to provide continuing education and training throughout such subsequent employment. These two changes will impose strains on the economy requiring the revision of priorities.

BRITISH UNIVERSITIES AND THE NATIONAL HEALTH SERVICE IN THIS CONTEXT

In this new situation for the western world Britain is one of those countries at the 'sharp end' where the problems are more acute because of social, political, and structural factors which, since the Second World War, have acted as brakes on change. It is pertinent to ask in this context and also that of this book what *should* happen to the universities and the National Health Service, bearing in mind that both will be competing for scarce resources. Industry will claim funds for reinvestment and higher education will also be competing with new educational activities which will have to be provided to achieve the levels of skills required for Britain's future role; that role depends primarily on a physically fit, mentally alert, highly educated, and trained population.

Against this background and in the narrower context of this book the problem is therefore how excellence and

coverage can be promoted and maintained in the services provided by the universities and the National Health Service, especially during the inevitable period of financial stringency before the re-adjustments of industry begin to pay dividends. To consider these questions a brief recapitulation of the origins and subsequent development to the present day of the arrangements for medical education and research and for the delivery of health care is helpful.

The State is now the major provider of the resources for both but only became so after the Second World War. Before that it did not own hospitals and the universities were dependent on State support for only about one third of their income. As late as 1910 there was no Ministry of Health, no Research Council, and no University Grants Committee though committees to recommend disbursement to universities of minute Exchequer Grants were created *ad hoc,* from time to time. Now (1981) the National Health Service spends roughly about £13,000m equivalent to 6·16 per cent Gross Domestic Product (GDP) and employs 820,000 people in the discharge of its mission to provide almost all the health care available in this country and does so without payment of any fee by the recipient at the time he or she receives it. Less than 10 per cent of National Health Service employees are doctors of whom virtually all those who are British will have been educated in British universities which have the complete responsibility for their primary preclinical and clinical training, have a significant and increasing role in postgraduate training and whose staff carry out the vast majority of the publishable research in preclinical biomedical sciences (and a significant part of the clinical) which emanates from this country. The public funds which flow into universities in the form of UGC grants and the fees of British students amounted to over £1250m in 1980/81 of which about 20 per cent was used on medical and dental education and research even though those undergraduates studying these subjects numbered less than 10 per cent of the total student population and, in addition, academic biomedical research workers received

further help from the Medical Research Council. Each year the UK now spends on health care, medical education and research, a sum equivalent to about 6·3 per cent of the GDP, comparable with that spent on the whole of education or defence. In 1974, the year in which the inflation-rate was close to 30 per cent the corresponding figure was 4·9 per cent. It is pertinent to ask why, when every government of whatever complexion since 1976 has aimed to contain public expenditure by the device of 'cash limits', the percentage of GDP spent on health care and education has nevertheless risen by almost one quarter since 1974. The failure of GDP to grow by more than about 3 per cent during this period makes this phenomenon all the more surprising. There are several contributory factors, one of which is the very success of modern scientific medicine. This has added to the doctors' armoury of procedures for diagnosis and treatment not previously possible and which ultimately prolong life. These procedures are increasingly sophisticated in terms both of the equipment used and the skill and size of the teams of professional staff required for their application. Treatment costs therefore rise. Further this success has caused a steady increase in life expectancy at birth, which is now 70 years for males and 76 years for females so that the need for geriatric care which is extremely expensive, being several times more costly than for younger age groups, always gets greater. No government has hitherto felt that, in these circumstances public expenditure on health care could be reduced.

The crux of the problem is that if health care is to be available to all solely on the basis of need, in accordance with the spirit of the 1946 Act, then the costs to the nation are bound to go on increasing. If, on the other hand, the will of the country is that, for other compelling reasons, public expenditure on the Health Service must be contained within some specified limit, then choices must be made as to who lives and who dies. Such a situation will put excruciating pressures on doctors and on those close to patients. Worse still, in a free society it is inevitable that those who can

evade this decision by buying health care privately will do so and the poor and inarticulate will suffer unless special provision is made for them. Clearly a decision to contain health service expenditure would involve matters of great political and moral principle which lie outside the scope of this book. Nevertheless two further comments may be made here. The first relates to the scale and manner of financing health care. Here the point must be made that the money spent on health care in the UK is a smaller fraction of GDP than the majority of Western advanced countries including Australia, Canada, USA, France, Germany, and Sweden. Moreover one possible reason why governments are more reluctant to allow the amount spent on the NHS to rise still further as a proportion of the GDP is that almost half the money required is raised by central government through direct taxation. In France, Germany, and the Netherlands a quarter or less is raised in this manner and correspondingly more is raised by employers' and employees' contributions. There is a certain historical irony here in that Sir William Beveridge always envisaged that a large part of the finance would be drawn from employer and employee contributions as in the original Lloyd George Act of 1910. The second comment is that there is absolutely no evidence in support of the view that other advanced countries either educate doctors or deliver the health care at levels as high as those in Britain at lower cost; indeed the reverse is the case and some of the reasons for this have been given earlier. Paradoxically some of these other countries, including those with left-wing governments like Sweden, do hive off to private contractors some of the work such as the laundry of soiled linen, and the maintenance of hospital grounds and premises which in the UK is directly undertaken by the NHS itself. It is to be hoped that if, in an effort to contain costs, some of the services provided to hospital patients which may be described as the 'hotel services' are charged to the patients, then the strictly medical, nursing, and other professional services will remain 'free and accessible to all' and the dangers of less cost-effective private medicine

thereby avoided. But whatever charges are made it now seems inevitable that within the NHS itself the pressures at all levels to achieve economies will continue throughout this century and this is bound to affect the relationship of the Service with the universities.

THE ADMINISTRATIVE STRUCTURE

As a first step in considering what improvements in this relationship are possible it is necessary to look at the components of the organizational structure between the highest governmental level and the lowest level where, in the lecture room and the laboratories, doctors are trained and, in the hospitals and general practices, where they work. The important elements of the structure are shown diagrammatically in simplified form in Fig. 4. At the highest level stands the government whose task is to set the policy objectives, to establish the instruments by which these objectives are to be reached and to determine the quantum of money which it will allocate annually to each of the Departments concerned. At the Departmental level there are the Department of Education and Science and the Health Departments (Department of Health and Social Security, Scottish Home and Health Department, and the Welsh Office). The latter have to decide on the moneys which they can allocate to their various geographical regions from the sums set aside for the National Health Service. The Department of Education and Science has to decide how much of the money it has been allocated can be remitted to the UGC and the Research Councils in competition with other educational and research services which government supports either directly or indirectly through the rate support grant. It is at these central government levels that policy decisions such as the number of doctors in various categories per million of population, the geographical distribution of doctors, and other need and resource priorities must be reached. Many factors will affect these decisions, including influential reports of bodies like Royal

Commissions on the Health Service and on Medical Education and, not least, will be the state of the economy which, if adverse, will lead to postponement of the target dates.

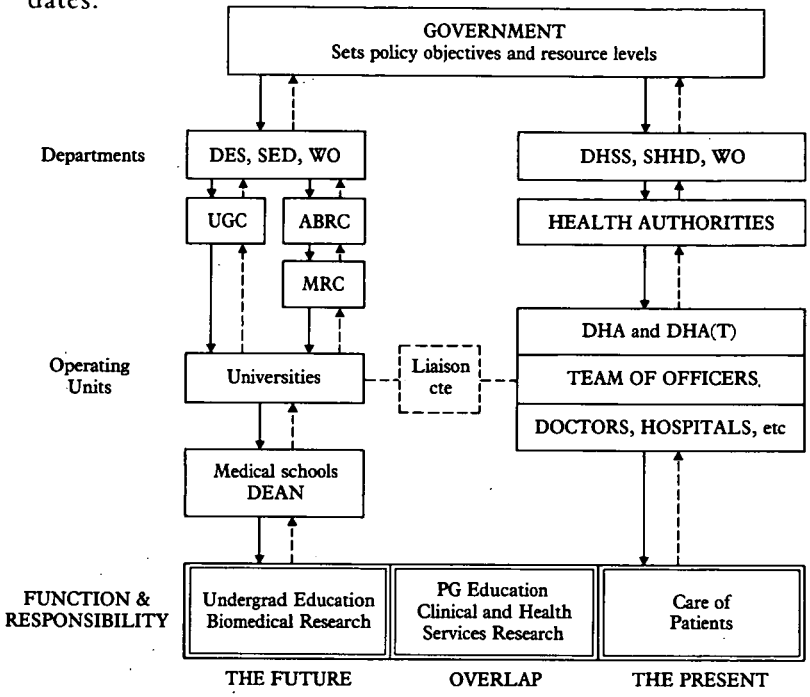

FIG. 4. Diagram to illustrate the flow of money and guidance (↓) and the desirable feedback (↑) of advice based on experience at the working level.

Between the Departments and the peripheral units, comprizing the universities and the District Health Authorities which manage the hospitals and relate directly to the local general practitioners, stand bodies like the University Grants Committee, the Advisory Board for the Research Councils, the Medical Research Council, and the Regional Health Authority all of which have functions of strategic planning and resource allocation and which have to ensure that, whilst the collective contributions of the operational

units to the services provided match the national targets, these units and their staffs have the proper degree of professional autonomy so that in dealing with individuals, patients or students, standards are maintained and direct ministerial interference at this level is avoided unless there are abuses for which remedy can only be achieved by ministerial action. The full vertical arrows in the scheme represent the flow downwards of guidance, policy decisions, and resources. Such a system will not work without good lines of communication in the reverse direction (shown by broken arrows) so that there is an adequate feedback of knowledge and information from the operational units all the way to the government departments. Without this feedback national policy could not be modified according to the real needs as actually experienced at the working level.

All institutions have inescapable inertias caused by the fact that changes such as the provision of capital facilities, the re-deployment of professional people or alterations in their educational preparation take time, often measured in years. Better value for money therefore requires longer planning horizons and the tragedy is that a scarcity of resources which makes the former even more urgently necessary seems inevitably to drive governments away from long-term planning to short-term, and therefore often counter-productive, expensive, and mistaken expedients. Finally, if Parliamentary democracy is to have any reality, comprehensive accounts of the performance of the system should be rendered regularly to Parliament. The lack of this in the past was one of the reasons for the House of Commons setting up monitoring Select Committees opposite each large Department. However it has to be recognized that desirable as such Annual Reports may be in principle, their preparation would in practice be an exceedingly exacting business and one presenting some subtle questions of value judgements.

In earlier chapters illustrations were given to show how, since the last war, some real gains have been made in medical education and research but it was also indicated that

more could be done by way of broadening the primary training of the doctor. Similar gains can be recorded or are in prospect for the Health Service, e.g. the removal of an unnecessary administrative tier (Area Health Authorities were abolished in 1982) movement to a more equitable geographical distribution of resources and the increase in the number of consultants. However there remains one problem which would be difficult to solve in times of plenty and is exacerbated in the current financial scarcity which seems likely to persist for some time.

THE UNIVERSITY AND THE DHA (T) WHERE THE FUTURE CONFRONTS THE PRESENT

The problem is evident at the lowest level of Fig. 4 where a District Health Authority (Teaching)[3] and a University Medical School come into contact through a necessary sharing of facilities but whose main objectives differ. The fruits of the work of a university in research and teaching emerge in the *future* and, for the sake of a better future, it must maintain the highest level of excellence in both. The major future beneficiary of the attainment of high standards in this work will be the Health Service and its patients. In marked contrast Health Authorities at local levels are dominated by the *present*; their duty is to cater adequately for the needs of existing 'client groups' of patients. No doubt it is this consideration which has led to the membership of these authorities being predominantly lay and representative of the people who reside in the district. Leaving aside the obvious questions of the wisdom of governing such a large, complex and expensive organization as a Health Authority, which may spend upwards of (£100m a year, by a 'Board of Directors', all of whom are very part-time and, with one exception, unpaid, and the danger of the Authority becoming the captive of a full-time team of professional officers, there is the central question whether such a body, in whose hospitals and health centres many of the academic staff of medical schools work, can strike the right balance

between the delivery of health care and clinical teaching and research. *A District Health Authority which manages university hospitals is the place where the future confronts the present and the problem is to make this confrontation productive rather than cause sterile and destructive tensions.*

One solution would be to alter radically the governance of teaching hospitals. Only two possibilities exist. The first, adopted in parts of Europe and the USA, is for the universities to own and operate these hospitals and to administer part of the local general practitioner service. This is not a possibility for Britain.

In the first place universities are neither organized nor financed in a manner which makes them appropriate administrative agencies for public services like hospitals, nor do they have the necessary expertise. Secondly, since the universities are financed through the UGC that body would have to make additional allocations to universities with medical schools in respect of the support of the hospitals which they would own. At present it is not equipped to do so without the help of the Department of Health and Social Security so that the net effect of this change would be to transfer this decision from the local level, where the detailed knowledge is, to the governmental level which would have to develop a new mechanism for consulting local levels on this specific point. These bureaucratic complications clearly would not add to efficiency or economy. Thirdly, medical students need experience not only of university hospitals but also of medical practice which will give them some flavour of the working life which lies ahead of them. They must therefore be exposed to general practice and work in hospitals the patient-mix of which is determined by local needs. At present this latter point is met by some of the clinical teaching being carried out by whole-time academics holding consultant posts and responsibilities in 'normal hospitals'. Fourthly, the number of beds required for teaching medical students in the numbers typical of a British medical school are large and comprise a significant fraction of those controlled by a District Health Authority. There-

fore, University ownership of the hospital would not lessen but intensify the need for discussions between the University and the District Health Authority to ensure that the beds and services of the university hospital combined with those of the National Health Service hospitals in the District properly matched the District's needs. In short, one is forced to conclude that such a change would be so radical as to be unacceptable and the benefits that it might confer would neither justify the furore such a change would cause nor the difficulties it would create.

The second possibility is that those hospitals which are used for teaching should be detached from the main stream of the National Health Service administration and have their own governing bodies and derive their main resources directly from the Departments of Health in Westminster and Edinburgh and the Welsh Office. This is essentially the old Board of Governors system and has many of the disadvantages of the first solution.

The remaining possibility is that the present arrangements are improved by remedying the defects in governance of the hospitals and of the university or medical schools so that each partner, NHS and university takes better account of the needs of the other.

DESIRABLE CHANGE IN THE DHA (T)

The major defect of a Health Authority (Teaching) is the high proportion of members appointed as representative of the local authority or interests. These members have a dual handicap. In the first place it is rare to find many amongst them with sufficient experience and knowledge which would enable them to appreciate to the full the overriding importance for the future of the Health Service of making the teaching hospitals exemplars of the highest standards of patient care, the best techniques of diagnosis and treatment so that the student doctors are set targets of high commitment and personal performance which they must strive to maintain throughout their own later careers. If it is

difficult for these lay members to acknowledge the necessity of excellence it will be even more difficult for them to provide those extra resources which are the price of excellence. The recognition that a problem of this kind existed is implicit in the report of the Resource Allocation Working Party which was issued in September 1976. In its attempts to try and get a more equitable distribution of resources so that they better matched the relative needs for health care in different geographical regions the Working Party developed certain formulae and as part of that exercise it recognized that there were certain extra costs which fell on hospitals where teaching and research were carried out. It therefore recommended that a Service Increment For Teaching (SIFT), i.e. a sum of money, should be added to the allocation of a hospital for each student taught within it. Similar exercises were carried out in Scotland, Wales, and Northern Ireland but the teaching hospitals in Scotland were more fully protected than in England. That the Resource Allocation Working Party should recommend the application of formulae by Health Authorities in the allocation of resources as part of the Health Departments' guidance to Regions on their allocation of resources is itself a critical acknowledgement of the fact that those Authorities and their teams of officers were not adequately analysing their own costs and devising for themselves criteria which would make their own judgements on the allocation of resources more rational and defensible. In so far as it calls on these authorities to make better allocations the Resource Allocation Working Party report and recommendations are to be welcomed but all experience shows that centrally devised formulae should not be the sole basis for distribution of resources. Formulae devised at the centre should really serve as the starting point of careful thought leading to decisions at the periphery and not be a substitute for it. The impression is that many Authorities have found in these formulae a means of evading the responsibility of discriminatory judgement on their own part. This is unfortunate in relation to SIFT because there are genuine differences

between the needs of teaching hospitals in different medical schools. It cannot be disguised that discrimination will make considerable demands on Authority members if it is to be done properly. They will need to analyse rigorously needs and the costs of meeting them fully or in selected parts, to examine whether past decisions have had the intended consequences (and, if not, to modify them), to develop priorities, to test suggested formulae against the realities of local circumstances and to be sensitive to quality factors not always translatable into cost elements. Their willingness and ability to undertake such sustained and time-consuming work is vital if their collective decisions are to be well-informed and financial resources are to be deployed to best advantage.

The second handicap of these 'representative' members is the pressure to which they are subject by virtue of being elected e.g., as local councillors or appointed e.g., as trades union representatives or special interest groups. With the best will in the world these members, whose office depends upon those who voted for them, are bound to find it difficult to avoid giving excessive priority to the immediate interests of that local electorate, to resist pressures from party ideological groups, to give their support to what is rational and necessary in medical education and research. A former President of Yale University and a US Ambassador to the United Kingdom has made this point eloquently as follows 'general improvement in any human activity only happens when it has been demonstrated that a better way is possible. If that better way depends upon the popular vote before it can be tried the chances of innovation wither'.

Therefore, if the universities are to have the support from the NHS which will enable their medical schools to make the maximum possible contribution to that Service, both now and in the future, then the membership of the Authorities which control those hospitals within which clinical medicine is taught and researched should be adjusted so as to be able to appreciate more fully than at present the implications which this additional function has

for decisions which these Authorities have to make; the resources they seek from the Health Departments and the internal distribution of those they receive. I am not arguing for an abandonment of a democratic element but for a more informed one. Some of the desirable change might be achieved by an appointment policy which would attach weight to a 'representative' nominee's understanding and experience of academic medical problems. But these problems are sufficiently subtle, complex, and important also to justify some shift in the balance from 'representativeness' towards professional knowledge and competence by an increase in the proportion of members nominated by the University and the medical profession as was proposed and accepted for the Nottingham University Hospital Management Committee.[4] The same principle applies but with less force at the executive level where the Dean of the Medical School or his nominee should be at least an observer and, if not a member of the Authority, then a full member of its team of officers. Neither of these two provisions will eliminate the need for a liaison committee between the university and the Health Authority and it is essential that the deliberations of this liaison committee should always be reported to and considered by the Health Authority which should also make a reasoned response to all proposals from the liaison committee. It would be best if this committee were made a statutory committee of the Health Authority (T).[5]

RECIPROCAL CHANGE IN THE UNIVERSITIES

The obverse of this coin is that some Health Authority members should be on the governing body of the University and of the Faculty Board of Medicine. This is desirable not as a *quid pro quo,* which would be the weakest argument one could muster, but because discussions within the university as to the way in which its Medical School should develop would be enriched and improved by an input from those whose constant preoccupation is with the day-to-day

problems of providing a present Health Service and who may have imaginative and useful suggestions as to the ways in which the School might evolve and its contributions to health care in the District be improved. Additionally the university's own allocations which go towards the maintenance of its clinical teaching and research activities would be even more soundly based the more directly it was made aware of the Health Authority's own problems and policy. By the same token the Faculty, the Senate and the Council should receive and consider the reports of the liaison committee.

FINAL COMMENTS

Quite apart from gains at the purely local level to be obtained from a closer participation in each other's affairs of a University and District Health Authority, advantages would accrue at national levels. The feed-back from the periphery to the centre would be enhanced in quality. The UGC would be better informed about the needs of the Health Service and the Health Departments about those of the medical schools. Together by mutual support and understanding they might put up a better resistance to the insidious erosion of the medical ethic by the junior doctors which have introduced 'piece work' notions such as UMTs into the doctor's contract of service. This process has now advanced to the point where pre-clinical departments in subjects like human anatomy and physiology have fewer medically qualified members of staff than is educationally desirable because of the larger salaries which potential academic staff can earn by accepting posts in the Health Service. A similar difficulty which could be even more damaging is now likely to arise because whole-time consultants and other senior hospital medical and dental staff are to be permitted to engage in private practice either within or outside NHS hospitals provided that the gross private fee income does not exceed 10 per cent of the total NHS salary. Since the principle has always been agreed that

clinical academic staff with honorary consultant contracts who are entirely paid by the university should enjoy comparability of total remuneration with that of NHS consultants the implementation of this principle implies either than the universities should pay their clinical academic staff more (for no extra work!) or that the latter should be allowed to engage in private practice. Each course of action is fraught with difficulties. The first would be expensive at a time when universities' resources are diminishing and by increasing the salary differential between senior clinical academics and their colleagues of similar rank in preclinical medical and other departments would be damagingly divisive. Even more harmful would be to allow private practice for personal gain because patient care is unpredictable in its timing but inflexible in its requirements and must always have priority and therefore research and teaching would suffer disproportionately thus diminishing the quality of the education of the students and that of the patient care they will provide in the future as general practitioners or within the hospitals. Moreover inequities would arise between clinical academics in the same specialty in different universities and between those in different faculties in the same university because of variations in opportunities for private practice as between geographical locations and specialties.

Issues of salary are resolved nationally but, as the preceding paragraph illustrates, the Health Departments can only be fully appraised of the implications for medical schools of any initiatives they propose if the Health Authority (Teaching) has that depth of understanding of such implications as would come from much closer co-operation of the university with the District Health Authority than generally prevails at present. The same is true of the mirror image of this i.e. the implications for the Health Service locally of decisions taken by the UGC on financial allocations to universities. When, as in the last two years, these allocations are drastically cut, services provided by a university to a District Health Authority may perforce

be reduced with damaging effects on patient care as regards major fields such as surgery, medicine, geriatrics, paediatrics, and though less obvious to the patient equally important supporting activities such as immunology, pathology, microbiology, etc. Detailed attention has been given to this question in the report from the Social Services Committee of the House of Commons published in May 1982.[6]

Matching in difficulty the allocation of resources is that of apportionment of costs. When resources are scarce and individuals paid by and owing allegiance to different employers work side-by-side in the same premises sharing some of these resources, the expression of opinions about whether each employer is making a proper contribution towards shared costs can become insistent and sometimes shrill. This tension exists in teaching hospitals where consultants contribute to teaching and whole-time academics are also responsible for patients and provide some of the services. For many years there has been a concordat between the Health Departments and the UGC known as the 'knock for knock' agreement in which the UGC provides funds to a University to enable it to pay its due share of the capital cost for the building of that part of a new hospital needed for the accommodation of its own staff and for the running costs demanded of it by the Health Authority. The former creates no problem but the latter can lead, and has led, to acrimony especially because the university has no control over the activities which are the basis of the bills which the Health Authority require it to pay. The author's experience of one such case is that it could have been easily avoided if the measures proposed in the previous paragraphs had been in operation when the waste and the measures to remedy it could have been identified earlier and without the employment of external accountants and without acrimony. Avoidance of waste in large organizations is extremely important for if it is only, say, 0·1 per cent of the total, that money at the margin could be re-deployed to great effect. In the National Health Service,

for example, 0·1 per cent of the total expenditure corresponds to about £12m which could be used e.g. to add some 400 consultant posts to deprived regions.

In considering savings on both sides it is of paramount importance not to upset the knock-for-knock agreement because it is essential that clinicians, whether NHS consultants or university academic staff, should not let the quality of their work and their relationship be affected by questions of the origins of the resources each needs or the cash value of the contribution each makes to the work of the other and, in any event, it is all public money and under cash limits a financial separation of such desirable intermingling and co-operative effort would produce no savings but only employment for additional accounting staff and time wasted on discussions about which body should be charged for what.

Many other examples could be quoted of the need of a better overlap, better sharing of information, and better discussions between the National Health Service and the universities. The changes suggested here are not large or dramatic but the biological principle should not be forgotten that small mutations can be beneficial whilst large ones are generally lethal. If such changes are also accompanied by the improvements in undergraduate medical education, and if the universities can strengthen their role in the continuing education of doctors, then there is good reason to hope that even in Britain's straitened economic circumstances, which are likely to continue, the quality of the doctors and of the health care that they give throughout their lives may be still further raised. If, on the other hand, the country is diverted from this task into implementing irrelevant ideological changes such as the abolition of pay beds or the privatization of the hospitals there will be no gains financially or in the quality of health care, now or in the future.

ENVOI

Few of the problems discussed in this book are new and few admit of a final solution. My aim has been to consider if improvements in the universities and the National Health Service can be made, the paramount criterion being that these should be *in the public interest.* This was the spirit which animated the distinguished Royal Commissioners in their examination of university education in London 70 years ago (see ref 5, chapter 3). It therefore seems appropriate to let the Commissioners have the final word. The following extract is taken from paragraph 301 of the Final Report and the reader need only be reminded that the comment has contemporary relevance if for the London charitable hospitals he thinks of hospitals controlled by District Health Authorities (Teaching) and for 'the sick poor' he reads 'all'.

> ... the main justification for providing adequately for university education is the public interest, and this is perhaps more apparent in the case of medical education than in any other department of learning. Any reform of medical education which aims at providing fuller opportunity for systematic investigation by the teachers, and more scientific training for the students, has a twofold object in view. On the one hand there is the study of the causes and origins of disease, with as much regard to their prevention and removal as to the cure of individuals who are suffering from the diseases themselves; and on the other hand there is the training of the future medical practitioners of the country to look beyond their immediate work of recognising and treating disease to the social service they are privileged to perform as the instructed guardians of the public health. The London hospitals are public charities. Their primary object was and still is the cure of the sick poor who come there for treatment. But charity does not cease to care for individual suffering because the immediate impulse of pity is merged in the ampler compassion awakened by reflective thought. It is not only right that hospitals founded and supported by charity should be used to the fullest extent for medical education and the advancement of medical science, but there is evidence that the public are practically alive to the fact.

So be it!

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12. *University Research in the Arts and Humanities.* In some countries an organization exists with a specific task of assisting financially scholars in the arts and humanities to meet the costs of research. In Britain this has never been the practice and there is no arts and humanities research council. The reason for this has always been that the needs of these scholars were small in financial terms. Except for a subject like archaeology for which the British Academy receives public funds in order to enable it to maintain the various overseas British Schools, for other subjects for research in which the main needs were considered to be access to good libraries it was argued that the universities should be able to meet the needs of the scholars from their block grants. By and large this arrangement worked reasonably well until arts and humanities research began to develop rapidly in the 60s. Therefore when, in the 70s, the unit of resource began to decline it became necessary to give some protection to arts and humanities research. In response to this problem the UGC made a grant to the British Academy to augment the resources that Academy already had for allocation to able university staff who could not pursue their researches without some further small help.

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This document proposes changes in the composition of DHAs which are welcome moves in the right direction in the sense that it reduces the proportion of members appointed by local authorities and in Appendix 5 makes observations on liaison committees, the participation of the Dean in DMT meetings and cross representation between DHA and University Council which go some way to meet the points raised in the preceding paragraphs. Almost half the members are to be 'generalists' who live locally and are to be appointed by the Regional Health Authority. The key to the success of the DHA will clearly lie in the quality and effectiveness of this large group of members. In the author's opinion the medical school members are too low. If the view is taken that additional medical staff can qualify as 'generalist' members, a point which is not clear, this limitation can be overcome. If this is not the case it would be advantageous to the working of the DHA if the RHA would appoint as some of its 'generalist' members wise persons with a knowledge of the purposes and workings of universities; one would hope that, for example, a Senior Professor in Natural or Social Sciences who was regarded as an 'elder statesman' would be appointed.

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