Introduction

For one and one half millennia Galen of Pergamum influenced the practice of medicine in the Western world, and for rather longer in some parts outside it. That in the hands of his successors this influence became stultifying and inhibitory of progress was no fault of his, although critics, from Paracelsus in the sixteenth century to others in the present day, have tried to diminish his importance.[1] Yet even fifty years ago, when antibiotic therapy was in its infancy and synthetic pharmaceuticals were far less common than now, any pharmacy in the Western world would have stocked a range of basic medicaments known as 'galenicals' – tinctures, syrups, extracts and the like – which were the building blocks for many of the prescribed medicines of the time. Nor was the term merely a memorial, for many of these galenicals stood in a direct line of succession from Galen's own medicaments. Indeed some were virtually identical, and used for much the same purposes that he had recommended. And to this day his views on foods from vegetable sources are referred to with obvious sincerity in some modern herbals.[2]

I commence this introduction by discussing the man and his work in general terms. After this I deal with several matters that arise so frequently throughout the book that it seems better to discuss them now than to make repeated comment as the work proceeds.

GENERAL

I shall not attempt to provide a more comprehensive biography of Galen than to say that he lived from AD 129 until perhaps 210; that he had an excellent, and doubtless expensive, education in medicine and philosophy in several of the great centres of the Eastern Mediterranean; that he

[1] For Paracelsus see Pagel (1964) 315; for modern critics see, for example, Baum (1989) 607, although the criticism of Galen here is more for his alleged subservience to Aristotle.
[2] E.g. McIntyre (1988) 21.

spent the greater part of his mature professional life in Rome and was for a time the personal physician of the Emperor Marcus Aurelius; that he was prickly, combative and self-opinionated; and that he read widely and wrote voluminously.[3]

This present work, probably written late in his career, is of value for a number of reasons, and John Wilkins has given a valuable account of some in his foreword. There is no doubt that it holds much for a social historian of the times, such as the evidence it provides, and which has been used, for example by de Ste Croix, of the exploitation of the rural poor by the urban well-to-do[4] or, as a bizarre sidelight (at III.1; K. 663), on the rascally practices of certain innkeepers. As well, and importantly, it reveals some of Galen's views on the nature of medical knowledge and how that knowledge was logically to be validated. As Frede[5] has pointed out, Galen had a sufficiently confirmed place in the general philosophical tradition for professional philosophers to take note of, if only to disagree with, his views, and Barnes[6] accords him 'an honourable place in the history of logical science'. Finally, in this as well as in his other books Galen is often our only surviving source, frequently in direct if fragmentary quotation, for the words of other medical writers of antiquity whose works have been lost. Naturally enough, he was frequently selective in his references, which were usually made, approvingly or otherwise, to argue for his own theories. Selective or not, without them we would be a great deal more ignorant of ancient medicine than we are.

But all these benefits are secondary to what Galen himself must have regarded as the main purpose of the book, which was to describe the effect of particular foods or classes of foods upon the body, and the reciprocal effect of the body upon the foods. Aside from the obvious fact that deprivation of food leads to death, there were two reasons for this approach: first, because in antiquity there was a clear connection between food and pharmacology; and second, because of the perceived importance of regimen, of which diet was an important component, in the maintenance of health and the management of illness.

THE PLACE OF FOOD IN THE MEDICINE OF ANTIQUITY

As the ancients saw it, foodstuffs (or many of them) had a dual role – on the one hand as nutriment necessary for life and to provide the wherewithal

[3] For his early life see Nutton (1973). [4] De Ste Croix (1981) 13–14; 219.
[5] Frede (1981) 66. [6] Barnes (1991) 56.

for growth and reproduction; on the other as a drug (*pharmakon*), or better, pharmacological agent, with an effect, good or bad, upon the physiological processes of the body. To understand nutrition meant to understand what the body did to the food (as nutriment) in order to assimilate it into its tissues. To understand pharmacology meant to understand what the food (as drug) did to the body, and Galen makes a clear and logical distinction between the two activities, which were essentially those that modern pharmacology refers to as the phenomena of pharmacokinetics and pharmacodynamics. In fact he went a good deal further than this. He identified as 'foods' those items that the body assimilated into its own tissues. The rest were 'drugs' (*pharmaka*), and these were of four types. The first remain unaltered, but change and overcome the body, in the way that the body does foods; these drugs are 'absolutely deleterious and destructive of the animal's nature . . .'; that is, they are poisons. Also poisons are those of the second group, which 'take the cause of change from the body itself, then are putrefied and corrupted and in consequence then at the same time putrefy and corrupt the body . . .' The third and fourth groups are non-poisonous. The third warms the body but does it no harm, and the fourth, after acting upon the body, is eventually assimilated, and is both drug and food. In practice, poisons aside, there were items that invariably acted as drugs, and others that were invariably nutriments, but most lay somewhere along a line between those extremes, their role at any one time depending upon the circumstances at that time.[7] Within this last group he makes a further distinction between foods that were also 'cold' drugs and those that were also 'hot' drugs, the latter acting pharmacologically during the time that they were undergoing concoction in the veins and becoming foods when concoction had been completed.[8]

It should be said at this point that Galen's definition of 'food' was broad, embracing substances that we certainly should not now regard as such (for example, Indian hemp or marihuana) as well as others that were merely embellishments to food such as, then as now, poppy seed. But a great variety of foods was thought to have a therapeutic role. Some were believed to have a specific pharmacological action like promoting the flow of bile or thinning viscid mucous secretions, while others were thought to have a more general effect. To anticipate later discussion, all foods were considered to exhibit varying degrees of warmth and cold,

[7] *On Mixtures* K. 1.656 = Helmreich 92; see also Harig (1974) 90–1; Singer (1997) 271.
[8] *On Mixtures* K. 1.681 = Helmreich 107 = Singer (1997) 283.

moistness and dryness, and since many disease states were, it was believed, due to or at any rate manifested by aberrant mixtures of these qualities, on the principle of treatment with opposites foods were a valuable adjunct to other therapy, or even the only therapy available. This principle of treatment by opposites antedated Galen, at least as long before him as *Nature of Man*,[9] which was one of the Hippocratic works on which he wrote a commentary. In this present work, however, Galen deals only briefly with therapy, and for a more systematic treatment one should turn to his *On the Mixtures and Properties of Simple Drugs* or, as he did himself, to the *On the Materials of Medicine* of Dioscorides, written in the previous century.

REGIMEN

Rather than therapeutics, the bulk of this book has to do with such matters as the nomenclature of plants used for food, the nutritional value of their products and also of many non-vegetable foods, and the physiological and pathological effects arising from their use. Such an approach found its rationale in the kind of medicine that Galen implicitly advocates. This was as much concerned with the prevention of illness and the maintenance of good health as it was with the treatment of established disease. Its aim was to ensure that the individual was kept in the best possible physical condition, with an important qualification that the degree of training necessary for the extreme fitness of the athlete was not normal and was indeed potentially dysfunctional. This qualification had been made even in Hippocratic times, and was repeated by Galen in several of his works.[10] It has been revived in our own time with the recognition of the fact that over-training may have such unintended consequences as disturbed endocrine function (such as amenorrhoea in young women athletes), the early onset of osteoporosis and even sometimes a degree of immunological deficiency.

The way to this state of excellence, many believed, was through *diaita*, which we usually translate as regimen, and which meant much more than the word diet that is derived from it, embracing as it did virtually everything to do with the lifestyle of the individual. According to Celsus it was one of three forms of therapy available to the physician (although therapy was only a part of its purpose) – the others being surgery and

[9] Hippocrates, *On the Nature of Man* 9 = Loeb *Hippocrates* IV, 24–5.
[10] Hippocrates, *Aphorisms* 3 = Loeb *Hippocrates* IV, 98–9; Galen, *Thrasybulus* K. V.820 = *SM* III.43 and *Exhortation to Study the Arts* K. I.30 = *SM* I.123.

pharmacology.[11] The concerns of regimen were with the whole of an individual's activities, covering such things as how often and when one should bathe; the nature of one's work and leisure; sexual activity; and, of course, the food one ate and its preparation. This was a holistic approach to personal health two millennia before the word was coined and the concept popularized in the twentieth century. In Plato's *Charmides* it was said to be the attitude of the Thracian physicians, for whom treatment of the eyes involved treatment of the head, but treatment of the head without treatment of the body was folly, and so 'they apply their régime to the whole body and try to treat and heal the whole and the part together'.[12] This is much like the aphorism of the great Canadian physician Sir William Osler, to the effect that it was more important to know what sort of patient has a disease than what sort of disease a patient has.[13]

The idea of regimen in Greek medicine, it was said, originated with a certain Herodicus of Selymbria (a Megarian colony on the shores of the Propontus, now the Sea of Marmara), an athletic trainer whom Plato mentions several times, although not always with respect, as when, in the *Republic*, he has Socrates relate that Herodicus, out of concern for his own health, 'mixed physical culture with medicine and wore out first himself and then many others'.[14] Nor was the author of the Hippocratic *Epidemics VI* any more impressed: 'Herodicus killed fever patients with running, much wrestling, hot baths. A bad procedure.'[15]

But whatever such critics thought of it, regimen came to mean what Plato's Thracians had demonstrated, namely, that the patient was to be looked at as a totality, an entity in his or her own right, and not as a stereotype of some particular disease, and this attitude was just as applicable to the healthy person. We cannot tell now how deeply this view penetrated Greek medical practice. Greek doctors having, no doubt, the human failings of their modern successors, one can guess that it was ignored by some, given lip service by others, and observed with varying degrees of conviction by most. On the face of it, Galen seems to have recognized its value without abandoning other more active measures such as blood-letting and, of course, the time-honoured treatment by opposites.

Herodicus' theory is explained in the so-called *Anonymus Londinensis*, thought to be derived from a pupil of Aristotle and sometimes called the '*Menon Papyrus*':

[11] *On Medicine* proem 9 = Loeb *De medicina* 1, 6–7. [12] *Charmides* 157a-b (Jowett's translation).
[13] Cushing (1940) 489. [14] *Republic* 406b (Grube's translation).
[15] Hippocrates, *Epidemics* VI.3.18 = Loeb *Hippocrates* VII, 243 (Smith's translation).

But Herodicus of Selymbria thinks that diseases come from regimen. Regimen, he says, is according to nature when it includes exercise, and the proper amount of discomfort too, so that the nourishment is digested, and the body continually receives its increase as the nourishment is absorbed according to nature. For he thinks that health results when the body enjoys a natural regimen, and disease when the regimen is unnatural . . . It is said too that this writer called the art of medicine 'scientific guidance to the natural condition'.[16]

The author of the Hippocratic *Regimen I* also held closely to this theory, and the following extract could almost be taken as the *raison d'être* for this present work of Galen's:

I maintain that he who aspires to treat correctly of human regimen must first acquire knowledge and discernment of the nature of man in general . . . and further the power possessed severally by all the foods and drinks of our regimen, both the power each of them possessed by nature and the power given them by the constraint of human art . . . [but] . . . eating alone will not keep a man well; he must also take exercise. For food and exercise, while possessing opposite qualities, yet work together to produce health. For it is the nature of exercise to use up material, but of food and drink to make good deficiencies.[17]

GALEN AS RESEARCHER

Although regimen in the general management of illness as well as in the maintenance of health was clearly prominent in Galen's mind throughout this book, it is not a textbook of therapeutics in the sense of dealing in any systematic way with specific diseases. Nor is it a research-based work like his treatise on functional anatomy, *On the Use of the Parts*. His research in the present work lay in his (apparently exhaustive) trawling of the earlier literature – sometimes with attribution but more often, probably, without.

However, there are strong indications from time to time of his interest in epidemiological research, using that term in its broad modern sense to cover more than merely the investigation of disease transmission. There is good evidence, for example, that Galen had an instinctive grasp of one of the canons of modern statistical epidemiology. This is that, in order to identify the effect of an independent upon a dependent variable, all extraneous variables must be as far as practicable eliminated, or at least 'controlled' or if possible held constant. Indeed, Galen had already put this quite clearly in his treatise *On Mixtures*, in which, investigating the

[16] *Anonymus Londinensis* 49 (Jones's translation).
[17] *Regimen* 1.2 = Loeb *Hippocrates* IV, 226–7 (Jones's translation).

influence of age upon the natural warmth of a child, he insists upon the need to ensure that the children under examination should be identical in all things except those two variables, for example, they should be of the same degree of plumpness. From what he writes in the present work one can guess that such views on statistical inference had been stimulated by the agricultural experimentation of his greatly respected father, which he describes in 1.37 (K. 552).

He was also an experimental physiologist. Thus, keeping our attention on the alimentary tract, in *Natural Faculties* he describes how, using a vivisected pig, he investigated the factors involved in the retention of ingested food in the stomach. He decided that it had less to do with the extent of liquefaction of the contents than with their degree of concoction, and that it was a matter of the food being changed into something proper to the animal that was being nourished.[18]

It is therefore not idle to speculate upon the factors (apart from the inevitable one of age) that might have inhibited Galen from making further progress in such investigations.

There are two obvious culprits. The first relates to what was in effect a cultural taboo on human anatomizing. As is well known, Galen's dependence on primate surrogates such as the ape, and non-primate mammalian subjects such as the pig, led him into errors in describing human anatomy. Most were of no great practical significance in the context of the times. Of much greater importance was the fact that the taboo removed all possibility of developing the study of human morbid, or pathological, anatomy. The purpose of this discipline, which was consequently unavailable to Galen, is to relate the perceived signs and symptoms of illness to anatomical changes in organs not normally accessible to observation but obtainable by post-mortem examination. Inability to do this inevitably leads to incorrect and sometimes fantastic hypotheses, although it must be said that Galen at times comes uncannily close to reality when one might have thought that fantasy would have been the next step. A good example in the present work is his association of splenic with hepatic pathology.

The second culprit was the almost complete absence of technological assistance and, most notably, of technology related to measurement. In the instance cited earlier, of the age/heat relationships of children, Galen had no means of objective measurement of body temperature. Had this been available to him, he must have realized at once the falsity of his

[18] *On the Natural Faculties* K. II.155 = Loeb *Galen on the Natural Faculties*, 240.

theory; indeed, most probably the 'theory' itself would have been still-born. The purpose of measurement in medicine is essentially one of comparison, whether it be comparison of repeated measurements of the same variable in the one individual to detect change over time, or the comparison in an individual of the measurement of a particular variable with its so-called 'normal range', in other words as measured in a population of 'normal' individuals. It is certainly true, as Harig has pointed out,[19] that Galen was concerned to measure the intensity of effect of qualities, and that he used a terminology of gradation to do so. But this of its nature was a completely subjective exercise, quite unsuited to the purposes just mentioned. Physiological variables are continuous in their nature, but for comparative purposes must be expressed digitally. In practice there would have been almost nothing of the sort available to Galen, except for some physical measurements – height, span and so on, and there is no evidence that he used them – and a crude measure of the pulse rate.

The absence of technology had another effect, for technological and theoretical innovation interact reciprocally, each driving the other. One has only to consider the relationship between technological advances in gastroenterological endoscopy and advances in our knowledge of gastro-oesophageal pathology.

Medicine has always progressed in two ways. The first is through the accretion of knowledge resulting from painstaking research. The second is by conceptual leaps of such nature that they occur but rarely, perhaps centuries apart – in antiquity, the Hippocratic *On the Sacred Disease*, which took medicine out of the temple and eventually differentiated the physician from the priest; in the seventeenth century Harvey's *Circulation of the Blood*; Mendelian genetics and Pasteur's germ theory of infection in the nineteenth; perhaps the human genome in the twenty-first. Galen made no conceptual leaps. The advances he initiated were of the first category. But his research hardly explains the long and influential life of his work. Something about it, clearly, must have so satisfied his students and his students' students that his writings were reproduced (and translated) in the numbers necessary to survive the ravages of rats, floods, fire and neglect, while the work of other eminent physicians disappeared or survived only as fragments.

That something, I suggest, was a combination of his wide-ranging repertoire, his meticulous and detailed observation especially in his

[19] Harig (1974) 117.

anatomical work and, above all, the self-conscious aura of omniscience which pervades his work and to which, then just as now I suspect, the medical student always responds.

At this point it may be helpful to discuss several matters that recur throughout the text and which would otherwise demand repeated reference to the commentary.

PROPERTIES

This is an awkward word in English. We may speak of the property (or attribute) of something in terms of its physical characteristics, for example, that iron is hard and has a certain specific gravity. We can also speak of the property of a thing in terms of its chemical characteristics, for example, that under certain conditions iron can combine with sulphur to form iron sulphide. Beyond this chemical property, with certain substances, is their physiological property, for example, that in a certain chemical combination iron forms haemoglobin, which has the property of carrying oxygen in the blood to the tissues. And, of course, the substance may need to be described in terms of a pathological property, for example, that in certain states excess iron in the body can result in the condition known as haemochromatosis, with damage to the liver and other organs.

The last three examples are close to the meaning that Galen gives to the Greek word *dynamis*, which I have translated as 'property', and which is traditionally called 'faculty'. This word, which at times means power, might or force, also has the sense of capacity, ability or potentiality, as might be expected from its cognate verb which means, amongst other things, have the ability to. As so often, Galen is following Aristotle, who used the word as part of his technical vocabulary. As Aristotle explains,[20] the word has a twofold meaning. On the one hand it indicates a potentiality to produce change in something (an unexceptional Greek meaning); on the other, it indicates the potentiality in a thing to undergo change or, as Ross[21] puts it, 'of passing from one state to another'. It will be recognized that this precisely describes the twin activities of pharmacodynamics and pharmacokinetics, which were mentioned above. Not surprisingly, the existence of a particular property (*dynamis*) is assumed, and the property identified by its effect or activity (*energeia*). So aloes, which is able to increase the *tonos* (tension; tone) of the oesophagus has a *tonikos* (tonic) property.

[20] Aristotle, *Metaphysics* IX, 1046a5. [21] Ross (1995) 182.

There is little fundamental difference between Galen's views on chemical, physiological and pathological properties and our own. However, there is a great difference in respect of his attitude to physical appearances (these were not, strictly, *dynameis*). Unlike ourselves, Galen held that physical characteristics (say, colour) were reflected in physiological properties. So that in III.39 (K. 744) of the present work we learn that good red wine produces good red blood. It was, after all, a reasonable belief for the times.

HUMOURS AND QUALITIES

Throughout this work there are many references to humours – that they are healthy or unhealthy; thick or thin; easily produced from some foods and poorly from others. Sometimes such statements are general in their application while at others times they refer to particular humours.[22] Similarly, much is made of *kraseis* (mixtures, blends) of qualities – in foodstuffs, in the body as a whole, in individual parts of the body or in body fluids – referring to the different proportions of two pairs of contrarieties, moist and dry, warm and cold, which were dominant in the foods, body parts and body fluids (or humours); just as they were in the natural world of climates and seasons.[23] These two related concepts, of qualities and humours, went back a very long time. To trace their origin and subsequent development in any detail in the present context would be a tedious and unhelpful exercise. But the relevance of the fully developed concepts to Galen's view of medicine is undeniable. Moreover it was the authority of Galen that ensured their long life as a coherent, if ultimately untenable, theory.

Of course Galen was heavily in debt to a long line of predecessors – medical and non-medical – for his views. The notion of health as the product of a dynamic equilibrium between opposing influences goes back at least to Alcmaeon in the sixth century BC, and had been widely held by the Hippocratic writers. Plato took it and extended the notion beyond medicine to the cosmos. Aristotle developed and refined the concept of a *mesotês*, a middle state, in which the individual organ functioned well or otherwise according to whether or not the elements of which it was composed (earth, air, fire and water) were properly proportioned

[22] There are useful discussions of humours by Vallance in *OCD*[3] and by Nutton in Bynum and Porter (1993) chap. 3, 14.
[23] The fourfold pattern of humours, qualities and seasons is discussed at length in Schöner (1964).