The institution of a public lecture such as this, named after a great man, gives those who follow him the opportunity of keeping fresh in their minds his achievements, and by paying homage to his memory, of ensuring that those qualities by which men are deemed great do not suffer diminishment in the changing world that time brings.

Such a lecture also gives us the opportunity of restudying, each time afresh, those features of a man's life and work from which we can derive some guidance and encouragement, if not more practical outcome, in our own striving towards a clearer perception of the universe around us. John Snow was such a man, and it is to his memory that this lecture is dedicated.

The selection of a lecturer is a great responsibility on those charged with this office. My predecessors, six in number, have in their own rights been illustrious men. Only the first of them, Dr. George Edwards, was an anaesthetist. His first John Snow Lecture was a memorable one and it imprinted in an indelible fashion on the minds of those fortunate enough to hear it a lasting impression of the life and work of John Snow. Since then none of the other Snow lecturers have been anaesthetists. Dr. Grey Walter, Sir Ralph Stevenson, Sir Erskine Childers, Lord Cohen of Birkenhead, and Lord James of Rusholme, is every one of them great, and each will be well deserving of a memorial lecture in the dim years ahead. The impression is therefore given that those charged with the selection of a lecturer have in mind that the John Snow Lecture should not be devoted to the technical and scientific aspects of anaesthesia, but should aim at a greater generality of subject of special interest to anaesthetists.

I have brought to my aid in preparing this lecture the thoughts and experience of over thirty years of clinical anaesthesia, with perhaps two-thirds of that time in addition, spent in active participation, not only in the scientific development of anaesthesia, but in the establishment and acknowledgment of its place as a special branch of medicine in the life of this country. In my active life as an anaesthetist, I have spanned what must be perhaps the most exciting period of our specialty. The decade before the war was a clinical period, the emphasis being on the administration of anaesthesia in the operating theatre as a clinical art. The second period, the war years, re-established once again—this time permanently, I hope, as it did temporarily in the first world war—that anaesthesia is an important factor not to be neglected, determining morbidity and mortality after surgery. The birth of modern thoracic surgery during this period, to take but one of the many results of the stirring of anaesthetic scientific growth, was made possible by the beginning of physiological understanding by anaesthetists. Then came the post-war years and the rapid expansion of anaesthesia on a broad scientific basis. Between them, therefore, my thirty years cover a greater period of scientific expansion of anaesthesia, of appreciation by the community at large, and of involvement in the development of medicine as a whole, than was seen for the whole of the previous seventy years since the day of Snow.

Let us examine for a moment our reasons for considering Snow a great man, and worthy of this lecture named after him. Is it that he was an expert clinical anaesthetist? If this was so, we would have a plethora of lectures throughout the year. Is it for his inventiveness in designing apparatus and instruments? If that were so, he would not stand alone or even highest in the list of the illustrious. Perhaps it is that he was a pioneer. This we cannot accept in itself as good reason, for men find themselves in the stream of events by accident of birth and so cannot by this accident alone claim greatness. Is it that he was favoured by Royalty? This is undoubtedly a great privilege but not one that ensures or even deserves immortality.
Snow was not the first or the last to have an inventive mind. Nor was he the first or last by accident of birth to live when a new door of knowledge is opened. He was, however, one of those rare men able to distinguish clearly between the value and importance of manual dexterity in medicine, however advanced it may be and however much application and development of skill it may need, and those intellectual processes of mind given to so few which can recognize the dependence of craft on continually expanding medical scientific knowledge. For without an appreciation of this, any manoeuvre performed by the hand is of no more significance or capable of true development than that of the simplest and most elemental man in prehistoric times. For want of a better term I label these manual manoeuvres as craftwork.

I have little doubt that those who qualified in medicine at the same time as I did some thirty years ago, are familiar with the craft of the anaesthetist of that time being referred to as the “art of anaesthesia”. The dictionary gives an art as “the performance of workmanship or execution as an object in itself”. The field of medicine contains within it a great deal of art or craftwork—the application of bandages, the reduction of fractures, the passage of illuminated tubes into the body cavities, operative surgery in general, most of what are now called nursing procedures, most of what is now called physiotherapy, and so on. These procedures cannot, and in fact generally do not, demand a degree of training greater than that which obtains for the performance of far more complicated manoeuvres in other walks of life, notably in the factory.

These are things which could, if need pressed hard enough, be taught to pupils, as indeed they once were and in many parts of the world still are, who do not need to have a profound knowledge of the intricate workings of the human body, such as we believe forms the basis of a medical training. One can be taught very competently indeed how to drive a car without any understanding of the internal combustion engine.

It must be the intellectual effort in the background which makes the craftwork of medicine of benefit to our patients and which is the justification for the prolonged training of doctors, and for the high place they occupy in the community. There are a great many people, who have not been through the medical curriculum, but who are doing most valuable work in what are now called the professions supplementary to medicine. Familiar examples include radiography, physiotherapy, occupational therapy, chiropody, and laboratory work. They it is who are taking over the craftwork of medicine, but let it not be forgotten that they are largely if not entirely dependent on others with deeper understanding of the basic sciences on which their work rests for the further development of their fields.

If I have mentioned art or craft in connection with anaesthesia, I must also mention science. The dictionary defines it as a branch of study which is concerned either with a connected body of demonstrated truths or with observed facts systematically classified and more or less correlated by being brought under general laws and which includes trustworthy methods for the discovery of new truths within its domain.

Within the framework of this definition much of modern anaesthetic thinking and practice is contained. If the content of art in anaesthesia has not diminished, the content of science has increased enormously.

Snow’s biographer, Dr. Richardson, tells us of the famous meeting with the druggist who was “giving ether here and there and everywhere” and who was getting “quite an ether practice”. Snow is said to have thought to himself of the druggist “rather peculiar certainly, for the man has not the remotest chemical or physiological idea on the subject”.

Snow remarked on another occasion:

there would be a great uproar if a student were to undertake on the operating table to tie the femoral artery, and were to open a femoral vein, yet at some of our hospitals the administration of chloroform has been entrusted to the porter, who would only grin in ignorance if informed that each time his services were required, he performed the grand act of suspending for a time, the oxydation of the whole body, and of inducing temporary death, and who would tell you if you asked him the composition of chloroform that it was “smelling stuff”.

This is the real reason for this lecture, for here is a man who felt that where the human organism is concerned craft alone is insufficient, for it involves an interference with and perhaps a suspension of the vital functions, and with it the possibility of death. An intellectual background of understanding is needed to sustain the necessary craft, and to nourish its roots so that development can ensue.
In our complex society, with all the infinite gradations of personality, intellectual capacity and manual skills, to say nothing of physical and other subtle characteristics, which make up the human race, the need has existed from time immemorial to distinguish between men in their value to the community, and to reward them accordingly. In modern times as in ancient ones the general result of this social classification becomes overt in terms of degrees of what is now popularly called affluence. This is the way society demonstrates how it values different men, for it shows its opinions by the material rewards of life it gives them. In this process, the craftworker, in general, does not show up so well as he whose gifts and skills are more intellectual. Even in Biblical days the matter was clear, and there are many references to the virtue of acquiring wisdom and understanding. Caution is sounded against even associating with those who do not value these accomplishments. What more expressive of this outlook is this extract from Ecclesiasticus:

The wisdom of a learned man cometh by opportunity of leisure . . .
How can he get wisdom that holdeth the plough . . .
That driveth oxen . . . and whose talk is of bullocks? . . .
So every carpenter . . . that laboreth night and day; . . .
The smith also sitting by the anvil . . .
So doth the potter sitting at his work . . .
And maketh all his work by number; . . .
All these trust to their hands:
And every one is wise in his work.
Without these cannot a city be inhabited: . . .
They shall not be sought for in public counsel
Nor sit on high in the congregation.
They shall not sit on the judges seat . . .
They cannot declare justice and judgment;
But they will maintain the state of the world
And all their desire is in the work of their craft.

There was thus no novelty in Snow's general approach to anaesthesia, the new-found development in medicine. He had, however, sufficient perception to apply it and the courage to act upon it. His condemnation in anaesthesia of craft unsupported by intellect, his immediate intellectual interest in this field, and his embarkation on a series of researches which resulted in learned contributions both spoken and written, established the fully trained physician as the proper person to administer anaesthesia.

These actions of Snow undoubtedly paved the way and established a climate of opinion which resulted in the general scientific development and administrative control of anaesthesia being in the hands of medical men, in contrast to the situation in almost every other country of the world. His attitude is thus responsible as much as any other single factor, for the enviable position in which British anaesthesia finds itself in 1964. In Britain, anaesthesia is clearly a branch of medicine, and its specialist practitioners have received formal acceptance both in the National Health Service, in the Armed Services, and in the Universities.

Nevertheless, the element of craft in anaesthesia is very evident to every onlooker and we are only just emerging from a period in which craft alone is deemed the biggest, if not the sole, accomplishment needed for expert anaesthesia. Within living memory the surest way to acquire fame in this field has been to invent an instrument or to perfect a technique. To indulge in speculation or experiment about aspects of anaesthesia and related subjects not ordinarily regarded as "practical" was generally dubbed highbrow, academic or theoretical, and was the province of but a few.

So far as we anaesthetists ourselves are concerned, these days are happily waning. The sure way to advancement now for the young anaesthetist is no longer by invention of a new gadget. It is by contributions to knowledge which are based on well-devised experiment, sound reasoning and logical deduction, and which result in a greater understanding, and therefore advancement, of some aspect of our work, so that new steps can be taken for the benefit of our patients. This climate is still comparatively new. There must be contemporaries of mine in this hall who have shared with me the experience of a scornful rejoinder from "practical" colleagues at attempts to study, to understand, and to apply to the field of anaesthesia knowledge from other allied fields such as, to take but a few, physics, biochemistry, electronics and statistics.

In the main body of medicine, this ferment within anaesthesia is but barely appreciated. Anaesthesia is still largely regarded as a craft and, in common with those other parts of the medical scene in which craft predominates, it is held to be in less need of intellectual effort, hardly, so it would seem to some, justifying the effort and cost of a full medical training.

We have not been alone in this unenviable position, though others have emerged more quickly.
The obstetrician has graduated from the midwife, the pathologist from the postmortem dissector, the radiologist from the X-ray machine manipulator, the physiotherapist from the masseur. All of these have either relegated their craftwork to laboratory technicians, radiographers, masseurs and so forth, or as in the case of the obstetrician, with whom, like ourselves, the development of the specialty has called for a considerable element of intellectuality, craftwork has assumed its proper proportion and could not be envisaged devoid of its intellectual background.

Surgery still stands in a peculiar position. Of humble and lowly origin from the barber, it is still largely a craftwork with little or no historical background of intellectual achievement. The great contributions of Hunter, an outstanding figure in its history, established surgical pathology and the need for accurate diagnosis before operation, and indicated that the surgeon could be something more than a technician who cut off arms and legs or tied aneurysms. His influence, however, has taken the better part of a century to make itself felt. It is only within the post-war years that surgery is making craft, as its main supporting skill, give way to intellectual study and development. The surgical journals which until so recently were filled with descriptions of operations and their multitudinous modifications, are now increasingly sprinkled with contributions which involve profound and fundamental modern knowledge, not only of medical science but of paramedical sciences as well. The surgeon has achieved a high medical value in the community in spite of being for so long a craftworker. This may well be regarded by the social historian of the future as a remarkable social phenomenon, and he may possibly interpret it as a measure of the extent to which public acclaim was related to public comprehension.

Although we anaesthetists can be pleased that in comparison with other craftworkers of medicine our progress has not been any slower in intellectual development, we must not rest on the assumption that it is either fast enough or wide enough. Our young anaesthetists are still far too often instructed rather than educated—trained into technicians rather than developed into thinkers. Too many of them are conditioned to regard their daily work as a series of routine procedures rather than as a series of exciting experiments in biological disturbance. Of all the cardinal sins in those who aspire to intellectuality, and we surely do, ignorance, especially if unrealized or unadmitted is the most destructive. Roger Bacon gave four causes of ignorance. The first he said was faith in authority. Authority in, for example, administration may be necessary and even desirable but authority in science, and particularly medical science, has little justification for existence. Whether in proposition or exposition the teacher has but one duty toward his pupils, to expose the truth so far as he can demonstrate it. For a teacher to claim authority for truth is but to expose his feet of clay, and for a pupil to point to his teacher as evidence for truth is but to demonstrate his own failure to appreciate what is meant by the scientific method.

The second of Roger Bacon's four causes of ignorance is the power of custom. We are all creatures of fashion and custom, and we like the security of being members of a flock and of behaving in the fashion of the flock. But if it were not for the militant minority who in putting forward their own views and conclusions risk the disfavour and unpopularity of the flock, little advance would ever be made in any human activity. Let us be thankful then that in anaesthesia, at any rate, we have had over the years those who have not hesitated to put forward the original idea, who have written the unusual book and who have been a little bit prickly at committee meetings, for without them it is doubtful if the number of specialist anaesthetists would be as large as it is.

Bacon's third cause of ignorance is illusion of sense. Few of us like to admit to deficiencies in comprehension and yet it is essential to be honest in this one particular if we are to further our intellectual advance. In anaesthesia as in any rapidly advancing field, both teachers and pupils alike are prone to this evil. Neither should hesitate to admit that they have failed to grasp a point, the teacher to himself at least, the pupil to his teacher.

The fourth cause Bacon gives is the proud delusion of an imagined wisdom. In this we see the man from whom we have suffered so much in anaesthesia. The man who denies the existence of a phenomenon because he has not personally experienced it, or who believes that his own halting perception excludes the interpretation of others. These are men who maintain an impressive silence in public discussion. Arm them with a few snippets
of fact, or a few technical terms and they will break silence only to cause confusion rather than elucidation. These are men we should fear, for it is against them that Sir Winston Churchill warned us when he observed that "the eminence of many men depends on the flatness of the plains all around them". We must see to it that in anaesthesia men become eminent who are not afraid to be surrounded with those who are themselves lofty.

An encouragement to intellectuality in anaesthesia in this country is the way in which one university after another is now taking an interest in anaesthesia. This means that formal academic recognition is being given to the two great needs which anaesthesia has in common with all other branches of true learning—the need for teaching and the need for thinking. These are the important dual functions of a university.

It does not matter greatly that only a few universities have taken the important step of creating chairs in anaesthetics. In medicine, teaching and thinking can go on in the humblest hospital, and they do not need the accolade of a professorial chair for their existence. Nevertheless, teaching needs teachers, and it may take a very long time yet before we have the number and the kind of teachers that we really need. Teaching needs for its proper performance, proper facilities—the time, the mechanical aids and the intellectual climate. Unfortunately too few of our hospitals, even the great ones, have these requisites for teaching. Besides teaching, the other function of a university is to encourage thinking, particularly in brave and new ways. When we speak of research we mean essentially an intellectual exercise in which experiment fits into a pattern of events, the genesis of which is hypothesis—the product of thinking. You may remember the pungent words of Private Willis in the second act of Iolanthe: "I am an intellectual chap and think of things that would astonish you". To some, anaesthetists may seem to be astonishing people but we must go on seeming to be so. Nothing gives more evidence of our intellectuality and power of thought than this apparent ability to astonish the community of medicine.

There is nevertheless the ever-present hazard of conformity in thinking. Neither the security of mind and warm comfort that derives from being with the majority nor the pride and self-glorification, if not self-pity, of being with the minority should deter anaesthetists from thinking about their work, as reasoning individuals, unconfined by convention and uninfluenced by authority. How well A. A. Milne's lighthearted pen put the matter: "the third-rate mind is only happy thinking with the majority, the second-rate mind only happy thinking with the minority, the first-rate mind only when it is thinking".

It is surprising that when considering new university departments of anaesthesia, they are so often thought of in terms of craft whose objective is hospital service alone. In order to establish a climate in which academic developments in anaesthesia might take place, one of the difficult hurdles is to convince university authorities (and that means a group of individuals) that the need is not that the incumbent of a chair should have a full clinical programme for himself and for any other members of the proposed new department but rather the reverse, so that there is freedom, to some extent at any rate, from the crushing burden of hospital routine service which more than anything else in anaesthesia stifles scientific initiative and inhibits forward thinking.

Teaching and thinking go hand in hand, and if there is one justification for university posts in anaesthesia it is that, by and large, universities are charged with providing facilities for teaching and thinking; facilities which are sadly lacking in ordinary hospital environments. The experience of working in a lively University Department of Anaesthetics and of taking part in discussion, where authoritarianism never raises its head, but where truth alone is the objective, is an experience which ought to be the birthright of every young anaesthetist.

John Snow's life and work, so abruptly terminated by his death in 1858, was characterized by the perception of the need in medicine to supplement, if not indeed to replace, craft with intellect. I see anaesthesia on the threshold of a new period in this process of development. This new period has as its springboard the combination of a more generalized appreciation within the medical community of the intellectual content of anaesthesia, and the presence within the specialty of an increasing number of anaesthetists who measure up to this.

In this new period of anaesthesia, new attitudes must emerge. The actual conduct of anesthesia in
the operating room, of course, remains the main concern. That it should be done ever more safely, ever more efficiently, ever more beneficially to the patient, needs no emphasis. In addition, it remains our concern that the skills and understandings deriving from anaesthesia, should spread out into the rest of medicine to benefit all.

These objectives are, however, incapable of full achievement unless we, in this new era of anaesthesia, not only make ourselves intellectual but see the craft side of our work in the perspective to which it belongs. Craft in anaesthesia is, so to speak, the exposed part of an iceberg that all can see, but which does not reveal the submerged nine-tenths without which the visible parts could not exist.

Now comes the question to which many of you have already no doubt given much thought. Can we or should we develop a cadre of craftworkers in anaesthesia in the same way, for example, as the radiologists, the pathologists and the practitioners of physical medicine have done? I have little doubt that we are going to need manual help in our work, to an ever increasing extent. Whether this comes from nurses, technicians or other individuals is immaterial. They are needed to lighten our physical labours and are obviously as necessary a part of the modern anaesthetic team of today, as the rest of the theatre staff are a part of the operating team. When it comes to the responsibility of administering anaesthesia, that is another matter, and never should the two be confused. The anaesthetic helper is no more fitted to administer anaesthesia than the surgical helper is to perform surgery. I do not believe that the complicated biological procedure implied by the word anaesthesia can ever be entrusted, without minute-to-minute supervision, to those who have not the necessary intellectual and medical background on which this work can be safely based.

Those who see another side to this coin may point to the large number of minor anaesthetics, to the cost of education, to the paucity of intellectuals, and to the widespread practice in other countries, notably the U.S.A., of using technicians. These are but side issues. If lives are valuable they must not be risked knowingly for financial reasons. Nevertheless, let us not be accused of being unpractical. The need for and the scarcity of intellectuality means a gap between supply and demand. Eventually the community will insist that the gap be filled, and if the best is not available the second best or even the third or fourth best will have to make do for the time being. This is expediency, and perhaps we shall see it come about, but this is something different from embarking on a formal and declared path, in which intellectuality is discarded and craft is elevated to be the main theme of anaesthesia. To do that would be to slip backwards, and to impose deliberately on the community, morbidity and mortality with which we have nowadays become unfamiliar. Before advocating this path we should think well of its certain consequences.

The present enviable situation in Britain, with respect to anaesthesia, is the result of many long years of development by many first-class minds. If they had not been drawn into this field during the last thirty years, we might still be in the crude ether-drop era; without controlled respiration, with primitive thoracic surgery and elementary neurosurgery, without hypotension, hypothermia and muscle relaxants perhaps even without endotracheal anaesthesia.

Who can doubt the dramatic and long-lasting effect on the progress of anaesthesia of the establishment of the first of the British chairs in Anaesthetics in Oxford. This department in which I had the honour and privilege to serve as First Assistant, was most productive in original research. It sowed the idea in many an open and receptive mind, and in more than one University Senate, that there was still a great deal to be discovered about anaesthetics, and that perhaps fields of surgery as yet only dreamed of would one day become clinical possibilities.

Under the energetic leadership of Macintosh, the Nuffield Department became the focal meeting point for postgraduates from all over the world, and a place where anaesthetists were not only trained to carry out the complicated techniques of clinical anaesthesia but to think of anaesthesia as a branch of medicine in which research could only take place and be fruitful if knowledge and skill derived from many other sciences were acquired and utilized. The present pressure in some quarters for technicians to conduct anaesthesia seems to take no account of this dependence of evolution in anaesthesia on intellect, and assumes that expediency with its inevitable stagnation, must guide the development of our anaesthetic services.
Trained anaesthetists are in short supply and are insufficient in numbers for the public need. Some way must be found of utilizing to the best advantage what supply there is. There are several choices, but only two deserve serious thought. The first is to use our highly trained anaesthetists to supervise lesser trained technicians in groups. In a limited way and for a limited time this may be practical, but standards inevitably fall as supervision becomes more a matter of lip service than of reality.

The other choice is some form of automation in anaesthesia, the potentialities of which have hardly been explored. There is nothing to stop us building into machinery the intellect of its anaesthetist-designers, just as a cylinder of compressed gas has stored within it the energy of the compressor. Only a short while ago Sir Leon Bagrit, in his First Reith Lecture, pointed out that man appeared all the time to be creating an extension of himself. Just as his energies are extended by the generation and transmission of power, so his nervous system and his thinking and decision-making facilities are extended through automation. Throughout industry, and indeed in everyday life, automation is the way in which the intellectual element which lies behind craft is made widely available. The brains of a few are in this way extended and made available to the many. In medicine and in anaesthesia in particular, this process may come too.

It is a nice point of discussion as to whether it is preferable to trust the life of a patient to the judgment of a technician with but rudimentary training in anatomy, pharmacology, physiology, physics, pathology, medicine and all else essential for anaesthesia, or whether to entrust it to an automatic device, carefully fabricated and greatly reliable, and which, by servo mechanisms as yet to be invented, maintains within some preset acceptable range of values, the functions of the respiratory, cardiovascular, heat regulating, metabolic and excretory and nervous systems. All this is feasible if not already in some part available and even in use. The supervision and working, if not the comprehension of such machines of the future, is not likely to be particularly difficult. To quote Bergen Evans in his book *The Natural History of Nonsense*:

> ... the difficulty is to decide at just what point God intended us to stop. Those who believe that the Mixmaster and the motor car are too much for us, seem to think that the bowl and buggy that preceded them are divinely ordained ... The fallacy of gadget gloom is that it assumes that a complex device is complicated to manipulate: whereas the reverse is nearer the truth. An alarm clock, for all its cogs and wheels, is easier to read than a sundial. A harness is a simple device compared with an electric starter, but hitching a horse is more difficult than stepping on a starter. A gyrocompass, once installed, is easier to operate than a tiller.

We are already moving on this pathway in anaesthesia, with our preoccupation with quantitation and with monitoring, and in general, with our concern to maintain physiological homeostasis. This may well be the direction in which the best extension and development of intellectualty in anaesthesia lies. The other direction, of the delegation of craftwork needing biological understanding to those without this comprehension, must ultimately lead to stagnation and sterility of development. The community should be firm in its striving for perfection, and should accept expediency if it has to, as a second-rate and, it is to be hoped, a short-term solution. We should therefore consider most carefully before demanding or instituting marks of technical competence, in such forms as diplomas in anaesthesia, for anyone who has not had what is generally considered to be the minimum scientific and biological training for an educated anaesthetist. Any such practice would be a retreat from the intellectual basis of anaesthesia which John Snow initiated.

I see anaesthesia, therefore, like so many human activities and especially like those others in medicine, as being a symbiosis of craft and intellect. Anaesthesia would not be anaesthesia without craft. But it cannot remain modern and scientific and also advance, if it remains craft alone. Sustaining the craft is an intellectual element which is still growing rapidly, and which is the main thing which makes this branch of medicine attractive to so many of our brightest doctors. If the anaesthetist is to retain his scientific conscience, his self-respect among his colleagues, and his economic security in the rapidly changing medical scene, the growing necessity for intellectuality is clear but it is bound to aggravate rather than diminish the present shortage of anaesthetists. If I have indicated some solutions of which at least one is somewhat fanciful, it is to indicate the seriousness of the matter. The obvious may not be the best, and the astonishing freshness of the anaesthetist's mind will yet solve this matter without the risk of physical harm to the public which the rejection of intellectuality would bring.
It is now 106 years since John Snow died and as an undoubted result of his initial influence, this country leads the world in the high standard of anaesthesia it provides for its citizens. Not a single person who is appointed to administer anaesthesia, but who is deemed suitable both by expertise and intellectual training to do so. There is no more fitting action on our part to revere the memory of John Snow than to see to it that his influence persists, so that anaesthesia by our own practice, our studies, and our researches, becomes universally appreciated as an intellectual field of medicine, worthy of the close attention of thinkers and educated persons.

BOOK REVIEW


The issue of a second edition of this book within three years of the first edition emphasizes the need for such a publication, particularly by those preparing for a higher qualification in anaesthetics. The authors state their desire to keep this edition about the same size as the previous one and have deleted the chapter on Oxygen, Carbon Dioxide and Helium to allow space for new drugs. It is difficult to assess whether this omission is justifiable for the data on these drugs in standard pharmacology or physiology books is not always adequately orientated to the needs of the anaesthetist.

The first edition contained no structural chemical formulae and this omission has been repaired, but only in part, in the present volume. With the “pharmacopoeia-type” presentation of data the formula usually follows the chemical name, official preparation and trade name of the drugs, and only rarely are these grouped together at the beginning of a section. To most readers an isolated chemical formula is a jumble of letters and lines, but if a number of drugs are presented in groups then they begin to have a meaning and only by such a presentation can the relationship between chemistry and action of the drugs be demonstrated. Furthermore, presentation of drugs in strictly alphabetical order does not help matters. As an example, diethyl ether (p. 140) and divinyl ether (p. 165) could logically be considered together pointing out that the unsaturated chains in the latter are the probable cause of its chemical instability.

Thiobarbitone, thiopentone and thiamylal only happen to be together because of a common first letter in their names and they are separated from buthalitone and methohexitone. However, the formulae of the barbiturates are presented together, although perhaps their chemistry is not discussed in sufficient detail. The reviewer wonders whether the time is not now ripe for a reclassification of these drugs, especially to separate those usually given by mouth and those injected intravenously. Even this latter group is capable of subdivision into two groups which bear some relationship to their clinical action and chemical structure. As long as one persists in referring to these compounds as “ultra-short” acting, their prolonged effects will not always be appreciated and accidents will continue to happen following their injudicious use. This is not a serious criticism of the work, but one which the authors might consider in subsequent editions.

The opiate analgesics could also be easily classified with benefit to readers and this would avoid contradictions such as stating that phenazocine is not related chemically to other analgesics (p. 81) and that it is a benzomorphan derivative (p. 117). One omission in this section is the widely used combination of dipipanone and cyclizine (Diconal). It would seem more logical to include nalorphine in the chapter on analgesics rather than under antides, although strictly speaking this is correct. However, readers could unthinkingly group it and levallorphan with amphienezole, nikethamide, etc., and fail to grasp the fundamentals of its mode of action.

As in the previous edition, as well as covering sedatives, analgesics, relaxants, local anaesthetics, premedicants and antidotes, chapters are devoted to cardiovascular drugs, diuretics, ureterine stimulants, enzymes, chemical transmitters, anticoagulants, antibacterial agents, infusion fluids, all of which are adequately covered. There is a useful appendix. One must not forget the useful opening chapter on fundamentals of drug action and the short sections on each group of drugs which precede describing individual members of these groups. There might be a case for including antithyroid drugs in subsequent editions. Other omissions include chlordiazepoxide (Librium), Welldorm tablets, hydroxyzine used as premedication, and the use of alcohol for nutritional purposes.

It is difficult to rationalize the use of references in this book. Some chapters have a few while others contain a useful bibliography. American publications are often criticized for ignoring British literature and in this book the boot may be on the other foot. More of the recent review articles could be quoted, particularly those in Clinical Pharmacology and Therapeutics.

Despite these criticisms, Wood-Smith and Stewart have done a great service to anaesthesia in producing this second edition of their book. It is well produced in clear print and can be recommended to all anaesthetists irrespective of their seniority.

John W. Dundee