LOCKE AND SYDENHAM ON THE TEACHING OF ANATOMY

by

KENNETH DEWHURST, B.LITT., L.R.C.P.I.

Corpus Christi College, Oxford

AMONGST the Shaftesbury Papers in the Public Records Office are several essays by John Locke, physician and philosopher. One of them, 'De Arte Medica', was published by Fox-Bourne[1] in his biography of Locke, and an uncorrected transcript was later reproduced by Gibson.[2] It was intended as part of an ambitious work in which Locke proposed to review the state of clinical medicine under the following headings:

1. The present state of the faculty of medicine as it now stands in reference to diseases and their cure.
2. The several degrees and steps whereby it grew to that height it is at present arrived to, which I suppose are the following, (1) Experience; (2) Method, founded upon philosophy and hypothesis; (3) Botanics; (4) Chymistry; (5) Anatomy; in all of which I shall endeavour to show how much each hath contributed to the advancing the art of physic, and wherein they came short of perfecting it.
3. What yet may be further done towards the more speedy and certain cure of diseases; i.e., by what means and method the practice of physic may be brought nearer to perfection.[3]

The work was never completed; but another fragment, 'Anatomica', dated 1668, and written in collaboration with Dr. Thomas Sydenham, was meant to form part of this treatise. It is one of Locke's many unpublished medical writings which show that he gave much more time and thought to his chosen profession than has been suggested by his biographers.

John Locke was born at Wrington near Bristol in 1632, eight years after Sydenham and ten years before Newton. He was educated at Westminster School, and graduated bachelor of arts from Christ Church, Oxford, in February 1665–6. He began his medical studies in 1659, much earlier than his biographers will allow. Fox-Bourne[4] suggests that Locke chose medicine as a career in 1666; but recently Aaron,[5] who completely dismisses Locke's association with medicine, states that he began the serious study of philosophy in 1667. This is a curious omission as Dr. E. T. Withington[6] in 1898 reproduced parts of one of Locke's commonplace books, dated 1659, which is full of medical notes and memoranda of the most varied kind. These notes show that Locke was acquainted with the work of such eminent anatomists as Wharton, Glisson and Willis: there are also many prescriptions and recommendations from his friends Dr. Richard Lower, the Hon. Robert Boyle and Dr. David Thomas.

During his early years at Oxford, Locke was greatly influenced by his friendship with Boyle, who with his associates had joined 'an experimental philosophicall clubbe', which later formed the nucleus of the Royal Society. Although Locke's official posts were successively lecturer in Greek, Rhetoric and, between

1661 and 1664, Censor in Moral Philosophy at Christ Church, these academic duties did not hinder his training in the sciences cognate to medicine. In 1663 we find him attending the chemistry lectures of Peter Sthael, 'a Lutheran and a great hater of women' whom Robert Boyle had brought to Oxford four years previously. Other members of the class were Dr. John Wallis, Christopher Wren, Thomas Millington, Dr. Ralph Bathurst, Henry Yerburg, Richard Lower and Anthony Wood,[7] who regarded Locke as 'a man of turbulent spirit, clamorous and never contented'. 'The club wrot and took notes', he continues, 'from the mouth of their master who sate at the upper end of a table, but the said J. Lock scorn'd to do it; so that while every man besides, of the club were writing, he would be prating and troublesome.'

After a brief diplomatic mission to Brandenburg as secretary to Sir Walter Vane, Locke returned to Oxford, where he began to devote more time to scientific pursuits. During 1665 he assisted Boyle in botanical and chemical[8] experiments: he also kept a daily register of the weather[9] in order to trace its relationship to the incidence and virulence of epidemic diseases. Locke had evidently decided to become an active medical practitioner in 1666, for in that year he attempted to obtain a dispensation for a doctorate in medicine without having previously gained his bachelor's degree.[10] His application was rejected; but nevertheless 'he entered on the physic line, ran a course of chemistry and got some little practice in Oxon'.[11]

Locke's supplication was turned down because he had not complied with the meagre requirements of the Oxford medical course. For a bachelor's degree in medicine his attendance was required for three years at the lectures of the Professors of Arabic, Anatomy and Medicine. It was also necessary to attend the dissection of one human body, followed by three lectures on the skeleton. At that time the official teachers were undistinguished, although a vast amount of experimental work was being carried out by private investigators, who were well ahead of the university curriculum. The experiments of Boyle, Lower, Willis and Wren attracted Locke's interest much more than the formal lectures and fruitless disputations which the university regulations demanded.

Locke was in partnership with Dr. David Thomas in February 1666–7 when he informed Boyle[12] that 'he is engaged upon a new sort of chemistry, that is extracting money out of the scholar's pockets, and if we can do that, you need not fear but in time we shall have the lapis'. It was due to his medical activities that Locke first met Lord Ashley, who was suffering from what Osler[13] has diagnosed as an hydatid abscess of the liver. Ashley had arranged with Dr. Thomas to take the waters of Astrop, a chalybeate spring near King's Sutton, which had acquired some reputation following its discovery by Dr. Thomas Willis in 1657. But Thomas happened to be out of Oxford when Ashley arrived, so he asked Locke to 'procure twelve bottles of water for my Lord Ashley to drink at Oxford, Sunday and Monday mornings'.[14] Locke and Ashley took a liking to one another, and shortly after their Oxford meeting Locke was invited to become physician to the Ashley family at Exeter House.

Once settled in the metropolis, Locke lost no time in making the acquaintance

of Thomas Sydenham, whose *Methodus Curandi Febres* had appeared in the previous year. Locke praised the author's views in a Latin poem which prefixed the second edition of this book. They began to assist one another in practice, and shortly afterwards Sydenham informed their common friend, Robert Boyle, that Locke had visited 'very many of my variolous patients especially'.[15] But the demands of metropolitan practice prevented Locke from continuing his experiments in chemistry, though he informed Boyle that his 'fingers still itch to be at it'.[16]

Unlike Locke, who became his devoted pupil, Thomas Sydenham was no scholar: he was essentially a practical man, whereas most of his colleagues were men of books. His formal medical training had been brief. Sydenham first entered Magdalen Hall, Oxford, in 1642, where he read the Arts course; but after one term's residence he left to serve the Parliamentary cause in the Civil War. He returned to the study of medicine after the war: first at his old college until the autumn of 1647, when he transferred to Wadham. In the spring of the following year Sydenham was elected bachelor of medicine by command of the Earl of Pembroke, the acting Lord Chancellor, and some six months later he gained a fellowship at All Souls. The whole of Sydenham's medical studies were completed within eighteen months, and even his postgraduate training was interrupted by the Scottish landing of Prince Charles, in which campaign he served as a Captain of Horse. Sydenham resigned his fellowship in 1655, and, after a short period of study at Montpellier, he began to practise in Westminster. It was here, between the years 1661 and 1664, that he made a detailed study of the London epidemics which, two years later, formed the basis of his book on the treatment of fevers.

As a result of their collaboration in clinical work, Locke and Sydenham planned to write a medical treatise of which this uncompleted fragment forms part. This essay, with its grammatical vagaries, sparse punctuation, repetitive arguments and inelegant phraseology, was undoubtedly written in haste. It may even have been dictated by Sydenham to Locke, and never subsequently revised. Such common abbreviations as 'wch.', 'instrumts.' and 'operacõns' have been written in full in the transcript, and a minimum of punctuation has been added.

ANATOMIE[17]

The opening sentence is in Sydenham's handwriting.

Others of them have more pompously and speciously prosecuted the promoting of this art by searching into the bowels of dead and living creatures, as well sound as diseased, to find out the seeds of discharging them, but with how little success such endeavors have been or are likely to be attended I shall here in some measure make appear.

The remainder of the essay was written by Locke.

Anatomie noe question is absolutely necessary to a Chirurgen and to a physitian who would direct a surgeon in incision and trepanning and severall other operations.[18] It often too directs the physician's hand in the right application of topicall remedys and his judgment in the

prognostique of wounds, humors and severall other organicall diseases. It may too in many cases satisfie a physician in the effects he finds produced by the method or medicines, and though it gives him not a full account of the causes or their ways of operation, yet may give him some light in the observation of diseases and the ideas he shall frame them, which, though not perhaps true in it self, yet will be a great help to his memory and guide to his practise. And not least it will be always thought an advantage for a physician to know as much of the subject he has to deal with as is possible. But that anatomie is like to afford any great improvement to the practise of physic, or assist a man in the findeing out and establishing a true method, I have reason to doubt. All that Anatomie can doe is only to shew us the gross and sensible parts of the body, or the vapid and dead juices all which, after the most diligent search, will be not much able to direct a physician how to cure a disease than how to make a man; for to remedy the defects of a part whose organicall constitution and that texture whereby it operates, he cannot possibly know, is alike hard, as to make a part which he knows not how is made. Now it is certaine and beyond controversy that nature performs all her operations on the body by parts so minute and insensible that I thinke noe body will ever hope or pretend, even by the assistance of glasses or any other invention, to come to a sight of them, and to tell us what organicall texture or what kinde of ferment (for whether it be done by one or both of these ways is yet a question and like to be soe always notwithstanding all the indications of the most accurate dissections) separate any part of the juices to any of the viscera, or tell us of what liquors the particles of these juices are, or if this could be donne (which yet is never like to be) would it at all contribute to the cure of the diseases of those very parts which we so perfectly knew. For suppose any one shall have so sharp a knife and sight as to discover the secret and effective composure of any part could he make an occular demonstration that the pores of the parenchyma of the liver or kidneys were either round or square and that the parts of urin and gall separated in these parts were a size and figure answerable to those pores. I ask how this would at all direct him in the cure either of the jaundice or stoppage of urin? What could this advantage his method or guide him to fit medicins? How knows he hereby that rhaburb or pellitary have in them fit wedges to divide the blood, or to such parts as may be separable, urin in the one, or gall in the other, or any other particles in them fitted to open these passages. How regulate his dose to mix his simples to prescribe all in a due method? All this is only from history and the advantage of a diligent observation of these diseases, of their beginning, progress, and ways of cure, which a physician may as well doe without a scrupulous enquiry into the anatomye of the parts, as a gardener may by his art and observation, be able to ripen, meliorate and preserve in fruit without examining what kindes of juices, fibres, pores etc. are to be found in the roots, barke, and body of the tree. An undeniable instance of this we have in the illiterate Indians,[19] who by enquirys suitable to wise though unlearned men, had found out the ways of cureing many diseases which exceeded the skill of the best read doctors that came out of Europe, who were better versed in Anatomy than those skillfull Indians, who were so far from makeing any dissections that they had not soe much as knives. And yet the Christians chose to trust them selves in their hands and found help from them when their owne doctors left them as incurable. No question but the dissector may know well the sensible parts of the organs for generation in man or woman by which the pox is conveyed from one to an other. But can he hence discover to me what kinde of venom it is that produces such horrid effects in the body? Why it corrodes this or pains that part of the body? Can his knife discover the recepticles which the nose soe easily affords, more than other parts, or will all his knowledge in the parts of the body point out one fit remedy for it? If therefore anatomie shew us neither the causes nor cures of most diseases I think it is not very likely to bring any great advantages for removeing the pains and maladys of mankind. Tis truth it pretends to teach us the use of the parts, but this, if it doth at all, it doth imperfectly and after a grosse manner. To evince this let us but consider the spleen and enquire what discoverys anatomy hath made in the use of that part, and after all I feare we shall finde that we know little or noe thing of what office it is, and what it contributes to the health or œconomy of the body, for the assigned uses of it being at best but uncertain and uselesse guesses which may appear in this little alteration hath been observed in those animals whose spleens have beene taken out and they lived long

afterwards. Now this proceeds not from the exceeding curious fabrique to undiscernable organs and tools of these parts alone, any of the rest that we are soe much at a losse in the functions of this viscus, but only from inflated opinion of our knowne knowledg, and a conceit that we are better acquainted with the operation of other parts than indeed we are. For haveing observed in some of the viscera a separation of some liquor or other, and that by certain vessels for that purpose certain juices are brought out of the part which were noe where convey'd in by their fellows, we presently conclude we know the use of the part, which is true in that in gross, and as to some effect we doe, as that gall is separated in the liver, urin in the kidneys, seed in the testicles, etc. But how the parte performes its duty by what engines it divides, precipitates, ferments, separates or what else you please to call it, we know noe more in the liver than in the spleene, nor will anatomy ever instruct us by shewing that gall comes from the liver how it is to be assisted in its defects or corrected in its errors when it does not this aright. Soe that he that does not know the size and situation of the liver, and has seen but some of its large vessels, their entrance in and comeing out of the substance of it, is like to know as much of its operation as he that shall dissect it, and spend whole years in traceing the meanders of its vessels. Tis no doubt we see gall and urin comeing from the liver and kidneys, and know these to be the effects of those parts, but are not hereby one jott nearer the cause nor manner of their operation. And he that upon this account shall imagine that he knows the use of the liver better than the spleen in order to his cureing of diseases may upon as good grounds persuade him selfe that he has discovered how nature makes minerall waters in the bowels of the earth better than he does; how she makes iron or lead because he sees the one flow out but the other liquid within whereas upon examination it will be found that the workmanship of nature is alike obscure in both. So that I thinke it is cleare that after all our porings and mangling the parts of animals we know noething but the grosse parts, see not the tools and contrivances by which nature works, and are as far off from the discoverys we aime at as ever. Soe that he that knows but the natural shape, size, situation and colour of any part is as well learned for the knowing of its diseases, and their cure, as he that can describe all the minute and sensible parts of it, can tell how many veins and arterys it has, and how distributed, count every fibre and describe all the qualitys of the parenchyma. Since he knows all this, and yet not to perceive how it performs its office, is indeed to take pains for something more difficult, but not a jott more usefull, than the other less accurate knowledg in anatomie mentioned. The laborious anatomist I will not deny knows more. But not more to the purpose, for if he cannot come to discover these little differences which preserve health or make a disease, if he cannot possibly see how nature prepares those juices which serve in their fitt places and proportions for the use and preservation of the body he may perhaps be the better anatomist by multiplying dissections, but not a better physician, for pouring and gazeing on the parts which we dissect without perceiving the very precise way of their working is but still a superficial knowledg, and though we cut into these inside, we see but the outside of things and make but a new superficies for ourselves to stare at. For could the intent looking upon any part lead us to cure its diseases then ladys would have more reason to go to the painter than physician for the removall of freckles and scabs, sore eyes, and sallow cheeks from their faces. But to make it yet clearer that when we pretend to discern by anatomie the use of parts it is only of these parts where we see something separated, and then all the knowledg we have is but that such a juice is there separated which is but a very scanty and uselesse discovery, and that which in a very few days may be perfectly attained in all the parts of the body. Let us consider the lungs a part of that constant necessity that we cannot live a minute without its exercise. And yet there being noe sensible a separation of anything in this viscus we are still at a perfect loss in its use (not to say anything that though anatomie but taught us its use yet it would not doe us much service towards the cure of its disease) and whether resperations[20] serve to coole the bloud, or give vent to its vapors, or to add a ferment to it, or to pound and mix its minute particles, or whether anything else is in dispute amongst the learned from whose controversys about it are like to arise rather more doubts than any clear determination of the parts, and all that anatomie has done in this case as well as severall others is but to offer new conjectures and flesh for endless disputations. Tis certain therefore that in parts where no separation is made the anatomist is forced to confesse

his ignorance, and but very doubtingly to assign the use of the parte; not that he has any more perfect or usefull knowledge of these parts where he finds a separation. Tis true he affirms it is the business of the liver to separate the Gall and tis probable he is in the right; but this does him no more service than the bare hearing that it is the business of a watchmaker to make a watch will instruct any one the better to make or mend it when out of order. So that I thinke I may, without injury to any body, say that as to the true use of parts and their manner of operation anatomy has hitherto made very slender discoverys. Nor does it give very much hopes of any greater improvement, haveing already baffled the endeavours of soe many learned, injenious, industrious and able men, not for want of any skill or sagacity in them, but because the matter they handled would not beare it. The tools where with nature works and the changes she produces in these particles being too small and too subtle for the observation of our senses, for when we go about to discover the curious artifice of nature, and take a view of the instruments by which she works, we may by as much reason expect to have a sight of these very spirits by which we hope to see them, for I believe they are as far from the reach of our senses as the other.

Let us next see how anatomie performs its undertaking in detecting the humors and discovering to us their natures and uses, and here I thinke we shall find it performes as little as in the other parts. And that for the same reason for though upon dissection we find severall juices where they are lodged and which way they tend, yet what part they beare in the œconomy of the body, what ferments, strainings, mixtures and other changes they receive in the severall parts through which they pass we cannot at all discover. For wherever allmost the anatomist makes his trylls, either the juices he observes must be dead extravascated and out of the regimen of the life and spirits of the body, or else the animall dead, and soe the parts which alter those juices loose their operation, and which so ever of these two happen, the humour he is examining will be of a far different nature and consideration from what it is when it has its due motion and activity in a living animal. All therefore that the anatomist can doe is to shew us the sensible qualities and motions of severall of the juices of the body, but how little this can possibly conduce to hypothesis or cureing of disease or preserving the health and easing the maladies of mankinde may well easily appear to a man who considers first that very few of these humors can be known in a living man. For whatever alterations may happen in chyle lympha succins pancreaticus, gall, and what ever other humors be in the body not immediately vented in some outward part, excepting the bloud, and how ever these alterations may concern the present state of health or sicknesse of any man, yet even the sensible qualities of those either natural or depraved juices cannot be known to the physician when he is considering the condition of his patient or the way to his recovery. Secondly those juices that may come within the observation of the physician are as the spitle, seed, urin, bloud etc. are liable to very great alterations in their sensible qualities without discovering any difference of health or sicknesse in the man, and he would be thought a very indiscrete man that upon every change he should find in his urin or spitle he should betake himself to a physician to rectify the disorders of his body: the vanity and quacking of uromantia have been sufficiently exploded by the learned and sober part of naturall physicians. But, thirdly, grant that these excretions doe give the physician any insight into either the constitution of the body or the condition of the disease, what thanks is there due to Anatomy for it? He that in a feavor or any other malady is able to make advantage from his inspection into the urin, and by that takes any indications, and chooses times for purging, bleeding, or the giving any medicin, doth not this one jott the better for knowing the structure of the veins, ureters, bladder etc., but by acquainting himself with the nature and history of the disease. And whether the stones be only a complication of vessels without parenchyma, or glandules consisting of vessels and parenchyma, will be of very little consideration when a man finds the excretion and colour of the seed praeternatural in a virulent gonorrhoea, and he that knows all the texture and constitution of that part is as far from knowing the cause of the yellowness or acrimony of the seed at that time, as he that has never seen any more of a testicle than a dish of lambstongs fried and served up to a table. The bloud noe question is the great genius of the body,[21] and that which is most concerned in the nourishment, health, and sicknesse of the man (for as for the succus nervosus whatever others may

thinke of it 'tis certaine the anatomist of all men, if he be true to his principles, should not suppose it, since he ought not to believe anything but what he sees, and when he makes it visible others may then believe it too) the bloud, I say, that is soe much concerned almost in every disease, is liable to examination without the help of dissection. And he that has but anatomy enough to know a vein and skill enough to use a lancet, or that stands by a surgeon that does, has, if he be a good physician and an observing man, more information from the bloud and light into the disease than ever he could gain by ripping up all the veins and arteries tracing their branches and meanders in ever soe many dead carcases. But, fourthly, granting all this, that the accurate anatomist knew more of the sensible qualities of the juices of the body and the kinds of their variations than another physician, I think he would after all that know very little more of the causes of diseases than a less accurate dissector. For after all the fine discourses of the taste, smell, colour, and consistence of the juices in the body, and the changes he supposes to be the cause of this or that disorder in the body, it is certainly something more subtle and fine than what our senses can take cognisance of that is the cause of the disease, and they are the invisible and insensible parts that govern preserve and disorder the œconomie of the body. This cannot be doubted by any who will allow themselves to consider different the blood as to all its sensible qualities is in severall feavoures which are certainly distempers that do affect and reside in the blood, from the blood in a healthy man. Who is able by seeing the blood to devise whether it be an intermittent or a continuall feavor, whether a dysentery or haemoptic the patient is sick of, and what sensible fault does often appear in that bloud in which nature does sometimes expel the cause of a disease, and give present ease by a critical haemorrhagia wherein the bloud very often looks as florid and as well conditioned as any that flows in the veins of the most healthy man living? Tis something therefore beyond florid or black, something besides acid, sweet, or salin that causes diseases, and appears to us only in the sad effects we may feel of it which may be very violent and horrid though the cause be very small in calor and insensible in its parts. What strange disorder will the bite of a viper cause in the body of the strongest man when all that he injects into the wounded flesh is not the tenth, yea, not the 1/100th part of a grain, and he that shall remember how many thousand more ounces of vitrum antimon, without wasting itself will vomit infused in wine, wherein it makes no sensible alteration, will have little need to seek for the cause of diseases, in the sensible difference of the humors. Some men that have made anatomical inquiries into the stomach, tell us the menstrum, which there causes appetite and digestion is acid. Others that it is more of kin sal amoniat., (for the naturall temper of that juice which lies at the threshold and very entrance of the body, and is but the first preparative to those other more refined and exalted ones afterwards to be produced is not yet agreed on after so many thousand dissections) be it acid, or salin, or else what other sensible quality it will, the appetite nor digestion seems not to depend upon the sensible constitution of that menstrum when it often happens that one who sits to table with a good stomach looses it utterly upon the receipt of suddaine bad news, or anything that violently stirs up any passion, and has noe longer any appetite, though nobody can thinke that the juice in the stomach is by such an accident made less acid than it was before. There is something therefore in the body and juices too curious and fine for us to discern which performs the offices in the severall parts, governs the health, and produces the various motions in the body upon whose inconceivable alterations depends our health or sicknesse. Hence a fright which causes such diseases as epilepsy, hysterical fits, and fatuity often cures others as agues, and, as some report, the gout it self; and 'tis probable in these cases 'twould puzzle the quickest sighted anatomist, assisted too by the best microscope, to find any sensible alteration made either in the juices or solid parts of the body.

But to put it beyond doubt that Anatomie is never like to shew us the minute organs of the parts or subtle particles of the juices on which depend all its operations and our health, it will suffice but to mention a mite or rather a little creature by the help of microscopes lately discovered in some kinde of sand. An animal soe small that it is not to be discerned by the naked eye, and yet his life and motion to the preservation of which there must necessarily be supposed a mouth, stomach, and guts, heart, veins, and arteries and juices in them, add to these brains, nerves, muscles, and bones without all of which it is hard to conceive life and

motion and all these to omit, eyes, ears, liver, spleen etc. to be certainly in an insensible particle of matter. Let the anatomist take this animalculum, or a mite (neither of which I suppose he will thinke to be a finer piece of workmanship than the body of a man, or to produce more refined spirits) and when he can but show the parts in one of these insects I shall believe he will be able to show the very operations of those parts in man. Until he does that he does very little towards the discovery of the cause and cure of diseases.

Tis certain, therefore, notwithstanding all our anatomicall scrutinys we are still ignorant, and like to be soe, and of the two essential causes of diseases their manner of production, formalities, ways of ceasing etc. must be much more in the dark into their cures upon such hypotheses. Or supposing it were the acidum amorum of the great Hippocrates, or the sal, sulphur, and mercury of the chemists that made disorders in the body, and we could come to know which of these in excess it was that produced this malady and where it was lodged, supposing v.g. that too much acid in the bloud or the juices caused the gout, a feavor, or epilepsy what indication would this give a practised physician in the cure of either of these diseases. Tis truth twill presently be suggested he must mortify this acidity but will he be thence enabled to choose fitt remedies, and a due method of their application; will he conclude that pearl, coral, or egg shells, because they take away the acidity in vinegar, will be certain and effectuall remedies in the removal of these maladies? He that shall proceed on such grounds as these may indeed constitute fine doctrines, and lay plausible hypotheses, but will not have much to brag of his cures. For the alterations that both our food and physic receives in our mouths, stomachs, guts, glandules etc. are soe many and soe unintelligible to us before they come to the place we design them, that they are quite another thing that we imagine, and work not as we phansie but as nature pleases; and we may as well expect that the juice of wormwood should retain its greenesse or bitternesse in the via lacten as any other medicine its naturall qualities till it come to the mass of bloud. For that it is not any sensible qualities by which medicines work their effects on our bodies, and soe cannot by these criterions be chosen and adapted to our hypothesis (all our knowledge of their efficacy being by acknowledgment old womens experience than learned mens theories) appears in that wormwood and colcynths are of distinct uses in physick, that sugar in some stomachs turns to acidity, and milk the most universal food in the world, is to some men as bad as poison. The anatomist will hardly be enabled to tell us, therefore, what changes any particular medicine either makes or receives in the body, till he can inform us of what artifice, and what shapes, nature makes in the bodys of animalls, volatil salts out of the juices of plants which appear not to have any such substance in them.

This essay has been dismissed as presenting 'a very narrow and bigoted' view.[22] Clearly Locke failed to realize that a rich clinical harvest was to be reaped, in later years, from the work of these early medical scientists. Indeed, the whole essay is strangely out of harmony with the previous record of a physician (destined to become a Fellow of the Royal Society) who had assisted Boyle in meteorological, chemical and botanical experiments; and whose commonplace books contain the lecture notes of Thomas Willis and Richard Lower.[23] There are two reasons for these incongruities. Locke and Sydenham were primarily opposed to the antiquated teaching of the universities; but at the same time they felt that the experiments of the early anatomists and physiologists had only a slight bearing upon clinical problems.

Medical science had reached one of the most important phases in its evolution when this essay was written. At that time it was still (according to Boyle[24]) 'much more high and philosophical to argue *a priori* than *a postiori*'. But the stout fortress of traditional learning (represented by theological Scholasticism and Aristotelian rationalism) was beginning to crumble beneath the combined

assaults of the experimental scientists who were (as far as medicine was concerned) grouped into two main schools: the iatrophysicists and the iatrochemists.

The ground had been cleared for the establishment of the iatrophysical school, under the leadership of Descartes, by the earlier discoveries of Galileo and Sanctorius. Descartes likened the human body to a highly complicated machine differentiated from animal structure only by the possession of a *rational soul*. Although he had only a meagre knowledge of anatomy and physiology, Descartes set about constructing a model, operated by wires, levers and pulleys, to illustrate human structure. Borrelli, who followed Descartes' lead, met with some success in explaining muscular and skeletal structure, but some of his disciples went too far in trying to interpret such physiological processes as digestion in purely mechanical terms. Such investigations were considered to fall entirely within the province of the iatrochemical school, whose leaders were Van Helmont, Glauber and Sylvius. Van Helmont was a milder Paracelsus, and Glauber, a noted chemist, who put forward the notion of chemical affinity. But Sylvius, who first studied the property of salts, became a too thorough-going iatrochemist when he began to interpret all biological activity in terms of an 'effervescence' resulting from the interaction of acid and alkali. Many of these experimentalists tried to push a reasonable hypothesis to unreasonable limits. They kept aloof from the vagaries of clinical practice: for medicine still cannot be rationalized. Occasionally they tended to push reason beyond observed facts, as did Thomas Willis in his *Rational Therapeutics*, which was widely read during the author's lifetime, but became completely discarded in favour of Sydenham's works a century later.

Locke was not opposed to the work of the early scientists; but he realized that anatomical research, in particular, was of limited value to the physician's main task of diagnosing and treating patients. His work with Sydenham taught him that a knowledge of anatomy and physiology was of slight value to a physician who is unacquainted with the natural history of the disease he is attempting to treat. And this essay clearly shows that he regarded a background of clinical experience more highly than a smattering of experimental science in the making of a competent physician. Many years later Locke still held the same view which he expressed in the following letter to William Molyneux:[25]

> You cannot imagine how far a little Observation, carefully made, by a Man not tied up to the four Humours, or Sal, Sulphur, and Mercury, or to Acid and Alcali, which has of late prevailed, will carry a Man in the curing of Diseases, though very stubborn and dangerous, and that with very little and common things and almost no medicine at all.

Here Locke is revealed as a thorough-going sceptic, who was prepared to discard the Hippocratic and Galenic concept of humoral pathology; the sal, sulphur and mercury of Paracelsus and Van Helmont, together with the acids and alkalis of his contemporaries, Sylvius and Willis.

But Locke and Sydenham were not alone in doubting the value of a detailed knowledge of anatomy and physiology in the training of a medical practitioner. Singer[26] has recently mentioned other distinguished physicians, including the Hippocratic doctors of the fifth and fourth centuries B.C.; several Arabic

writers, notably Rhazes (A.D. 852–932) and the French physician Baillou (1538–1613), who all criticized what they considered to be a misplaced emphasis upon anatomical dissections rather than upon clinical observation. One of Locke's contemporaries, Gideon Harvey,[27] refers to anatomists as

> those, that flea Dogs, and Cats, dry, roast, bake, parboil, steep in Vinegar, Lime-Water, or *aqua fortis*; Livers, Lungs, Kidneys, Calves brains, or any other entrail, and afterwards gaze on little particles of them through a microscope, and whatever false appearances are glanced into their eyes, these to obtrude to the World in Print, to no other end, than to beget a belief in the people, that they who have so profoundly dived into the bottomless pores of the parts, must undeniably be skilled in curing their distempers.

By stressing the importance of clinical experience gained from constant observation, rather than from chemical experiments and anatomical dissections, Locke and Sydenham laid the foundations of a sober empiricism which is still the hall-mark of the sound practitioner. They did more than this: they formed a third 'School', that of empirical medicine, which attracted just as many distinguished followers as did the experimentalists. Sydenham's books were praised by Boyle, and Mapletoft, Professor of Physic at Gresham College; other physicians mentioned by Payne,[28] who shared his views, were Drs. Paman, Brady, Cole, Goodall, Short and Needham, who were all well known in their day. Dr. Richard Morton[29] was a young disciple who extended Sydenham's work on fevers. On the Continent Sydenham's methods were taught by Schacht and Boerhaave at Leyden, Ettmüller at Leipzig, and Sponius at Lyons. But John Locke, the man of ideas, who first helped Sydenham, the practical physician, to formulate his philosophy of medicine, remained the strongest advocate of empirical medicine for nearly twenty years after Sydenham's death. Quietly, modestly, yet persistently, Locke urged physicians to follow Sydenham's lead. Locke's letters and diaries show that not only during his travels in France, where he met the leading physicians of Montpellier, Lyons and Paris, but afterwards, whilst a medical don at Christ Church, and also throughout his six years' exile in Holland, he constantly proclaimed Sydenham's genius and recommended his simple yet practical methods

By this plain, straightforward, historical approach to clinical problems, Locke and Sydenham placed clinical medicine upon a basis of probability. More than this they could not do. They realized that clinicians must be content to observe 'what is', and leave the scientists, theologians and philosophers to investigate and speculate upon the ultimate question of 'why it is'.

NOTES AND REFERENCES

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2. Gibson, A. G., *The Physician's Art*, Oxford, 1933, pp. 1–13.
3. 'De Arte Medica', P.R.O. File 30/24/47/2, fols. 38–47.

4. FOX-BOURNE, H. R., *op. cit.*, I, 91.
5. AARON, R. I., *John Locke*, Oxford, 1955, 2nd ed., p. 7.
6. WITHINGTON, E. T., 'John Locke as a medical practitioner', *Janus*, 1899, IV, 393, 457, 527, 579; also *Med. Mag.*, 1898, VII, 47, 375, 573.
7. *The Life and Times of Anthony Wood*, edited by Andrew Clark, Oxford, 1892, V, 472–3.
8. Letters from Locke to Boyle, 24 February 1666 and 24 March 1666–7. Cf. *The Works of the Hon. Robert Boyle*, 1772, pp. 536–7 and 537–8.
9. Letter from Boyle to Locke, 2 June 1666, MSS. Locke, C4, fols. 150–1, Bodleian Library. Also letter from Locke to Boyle, 5 May 1666, Boyle's *Works*, 1744, V, 136.
10. Locke's application was supported by the Earl of Clarendon, Chancellor of Oxford University. Cf. FOX-BOURNE, *op. cit.*, I, 139.
11. WOOD, A., *Atheane Oxonienses*, ed. Philip Bliss, Oxford, 1820, IV, 639.
12. Locke to Boyle, 24 February 1666. Cf. *The Works of the Hon. Robert Boyle*, 1772, VI, 537.
13. OSLER, SIR W., *An Alabama Student and Other Essays*, Oxford, 1926, pp. 69–74.
14. Letter from Thomas to Locke, 9 July 1666. Cf. Lord King's *Life and Letters of John Locke*, 1858, p. 404.
15. Letter from Sydenham to Boyle, 2 April 1668. Cf. Boyle's *Works*, 1772, VI, 648.
16. Locke to Boyle, 12 November 1667. *Ibid.*, VI, 539.
17. P.R.O. File 30/24/47/2.
18. James Yonge (1646–1721), a naval surgeon, reported four cases of severe brain wounds cured by trepanning. He surveyed the literature of brain injuries from the time of Galen, and found accounts of sixty patients cured by surgical procedures. See Yonge's *On Wounds of the Brain Proved Curable*, 1682.
19. In a letter to William Molyneux, Locke again compares the skill of the 'illiterate Americans with the learned Physicians that went thither out of Europe, stored with their Hypotheses, learned from Natural Philosophy, which made them indeed great men, and admired in the Schools; but in curing Diseases, the poor Americans who has 'scaped those splendid Clogs, clearly out-went them'. Locke to Molyneux, 15 June 1697. Cf. *Familiar Letters between Mr. John Locke and Several of his Friends*, 1742, 4th ed., p. 177.
20. Locke took a great interest in the work of Lower, Hooke and Mayow, who were investigating the respiratory system whilst Locke was at Christ Church. These Oxford scientists showed that the lungs could no longer be regarded as a bellows to cool the fiery heart. One entry in Locke's notebook reads: 'Bloud taken out of the artery of the lungs hath crassamentum nigrum like that which comes out of the veins soe that the red fluid bloud is made only in the ventricle of the heart which perhaps is by the mixture of the aire with which it gives it volatilization and colour. R.L.' MS. Locke, f. 19, fol. 226.
21. Locke stressed the importance of examining the blood as a diagnostic aid. In one of his notebooks (MS. Locke, f. 19, fols. 272–3 and fols. 302–3) there is a list of headings outlining a method for investigating the blood which was closely followed by Boyle in his *Memoirs of the Natural History of Humane Blood* (1683–4), dedicated: 'To the very Ingenious and learned Doctor J.L.', at whose request the work was undertaken. In the preface he writes: 'I will not be so rash as to say, that to mind (as too many Anatomists have done) the Solid parts of the Body, and overlook Enquiries into the Fluids, and especially the Blood, were little less improper in a Physician, than it would be in a Vinter to be very solicitous about the Structure of his Cask, and neglect the consideration of the Wine contain'd in it.'
22. FOX-BOURNE, H. R., *op. cit.*, I, 229.
23. MS. Locke, f. 19, Bodleian Library.
24. Robert Boyle, quoted by Joseph Needham: 'Mysticism and Empiricism in the Philosophy of Science.' In *Science, Medicine and History . . . Essays presented to Charles Singer*, 1953, II, 379.
25. Locke to Molyneux, 15 June 1697. Cf. *Familiar Letters between Mr. John Locke and Several of his Friends*, 1742, pp. 176–7.
26. SINGER, C., 'How Medicine became Anatomical'. *Brit. med. J.*, 1956, II, 1499–1503.

27. HARVEY, G., *Conclave of Physicians*, 1683, p. 68.
28. PAYNE, J. F., *Thomas Sydenham*, 1900, pp. 249–51.
29. Morton's books were praised by Dr. Eales in a letter to Locke of 14 May 1694. 'Dr. Morton's books I am extremely well pleased with; he has improved the Hints of our Good Friend the great Dr. Sydenham admirably well.' MS. Rawlinson C. 406, fol. 90, Bodleian Library.

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