

November 26, 1764. Read December 6, 1764.

... I should not have troubled you again in this way had I not found that some additions to my former papers were necessary in order to explain some passages in them, and particularly what is hinted in the note at the end of the Appendix: 'I have first given the deduction of Mr Bayes's second rule chiefly in his own words; and then added, as briefly as possible, the demonstrations of several propositions, which seem to improve considerably the solution of the problem, and to throw light on the nature of the curve by the quadrature of which this solution is obtained.' Perhaps, there is no reason for being anxious about proceeding to further improvements. It would, however, be very agreeable for me to see a yet easier and nearer approximation to the value of the two series in the first rule, but this I must leave abler persons to seek, chusing now entirely to drop the subject. The solution of the problem enquired after in the papers I have sent you has, I think, been hitherto a 'desideratum' in philosophy of some consequence. To this we are now in a great measure helped by the abilities and skill of our late worthy friend; and thus are furnished with a necessary guide in determining the nature and proportions of unknown causes from their effects, and an effectual guard against one great danger to which philosophers are subject; I mean, the danger of founding conclusions of an insufficient induction, and of receiving just conclusions with more assurance than the number of experiments will warrant.]

10.4 Richard Price, 1723-1791: his background, education, religious views and friends

It must be confessed that British Mathematics were at rather a low ebb during the second half of the 18th century. There are no names comparing with that brilliant group of Wallis, Halley, Newton, De Moivre, Brook Taylor and Stirling. Simpson it is true survived - in a fashion - till 1761, and Landen, Waring and Canton were mathematicians, but did not contribute to our branch of mathematics. There were physicists like Priestley, Cavendish and Wollaston, but they do not concern us. We have only minor luminaries like Bayes, Price, Morgan and Short to deal with. The matter had its corresponding continental phase, the period of Leibnitz and the Bernoullis was closed. Only Euler held aloft the torch, ready to surrender it into the hands of the Frenchmen, Lagrange, Condorcet, Laplace and Poisson who mark the next great epoch in mathematics. With them our subject begins 'to vibrate again'. Meanwhile we have to content ourselves with the sparse gleanings of the Newtonian harvest, with the work rather of professional theologians than mathematical statisticians. Yet even these small men teach us to take comfort from the fact that they managed to leave their names for ever associated with phases of our science. Bayes' Theorem is as much a part of our subject as Bernoulli's Theorem, or the Euler-Maclaurin Formulae. And

were you to ask a modern actuary who first placed life insurance on a firm basis he would undoubtedly reply not with the names of Halley, De Moivre or even Simpson, but with those of Dr Richard Price and of his nephew William Morgan. I think there has been some tendency to exaggerate the importance of Price's contributions to our subject, but we have undoubtedly to admit that he was personally one of the most interesting characters whom we find linked with the development of vital statistics. Price if not a great mathematician was a great Welshman, and as such he exhibited the usual racial characters, characters which make the Welsh great as preachers, but not without danger as politicians. Price was born in 1723 and died in 1791. To understand the events of his life you must bear in mind the chief historical facts of the second half of the 18th century. You have to remember that England was ruled by the representatives of a series of rotten or 'pocket' boroughs and that these boroughs were in the hands of great landed proprietors who openly bought and sold them. The masses were really unrepresented. A still worse state of slavery existed in France. The great principle for which Hampden and others had fought in the time of Charles I, that there should be no taxation without representation, had practically perished, because the masses were without true representation at all, and this both in England and in France. The American War was really a struggle for the reinstatement of John Hampden's principle, and Price in his works is not stating any new conception but merely reasserting a fundamental principle of safe government. Consider the following events occurring in the last quarter of the 18th century:

1772 Discontent in America. Letter of Charles Chauncy to Price,
 October 5, 1772.
 1774 Port-Act closing Boston. Letters of Chauncy to Price describing
 growing feeling. Lord Shelburne on America.
 1775 Before January 10, 1775, Continental Congress.
 1775 April 19. Lexington and Concord
 May 27. Hog Island
 June 17. Bunker Hill
 1776 July 4. Declaration of Independence.
 1778 France joins America.
 1783 Peace with America and France.
 The American Revolution led directly to the French Revolution.
 1788 Beginning of Revolt in France.
 1789 July 14. Storming of the Bastille. Louis XVI proclaimed
 'restorer of Liberties of France'.
 October 6. Riot and Carnage in Paris. Abduction of King and
 queen.
 1792 September 23. Republic declared.
 1793 January 21. Louis XVI guillotined.
 " October 16. Marie Antoinette guillotined.
 Reign of terror till Napoleon Buonaparte appeared in 1796.
 1800 Consular Government established and Directory abolished.
 What part was our non-conformist Price destined to play in these
 world-shaking events?
 Richard Price was the son of a strictly Calvinistic non-conformist

Rees Price minister, living at Llynton in Glamorganshire. Rees Price was in addition to his ministerial capacity a small landowner, and increased his position in this respect by marriage, as his first wife was wealthy and Rees Price, probably having in view the desire to found a family, left not only this wife's property but his own to a son by this marriage. Rees Price's second wife Catherine Richards was the daughter of a medical man in Bridgend. She appears to have been a woman of great character and loveableness and probably Richard Price owed little more to his father than the non-conformist tradition. The real ability came in through Catherine Richards. Of Rees Price's relation to his son Richard, we know little; he wished him to be educated for business, but Richard's inclination drew him to the ministry. At eight years Richard went to a school at Bridgend, then to one at Pentwyn, where the dissenting minister who conducted it was of the Arian persuasion. From Pentwyn Richard went to Vavasor Griffith's Academy when he was 15 (1738). These non-conformist 'academies' are somewhat interesting institutions. They depended essentially on the ability and character of their tutors or even of their tutor, for they were often one man colleges. They appear and disappear and reappear in another place with marvellous rapidity. The care of education seems officially to have been under the Anglican bishops, who alone were able to give a license to educate. Hence an academy would be established on the border of several dioceses and pop from one into the other as the bishops became inquisitive or troublesome. Theology, mathematics and philosophy, with languages, seem to have been the chief subjects of the teaching, and it would be good or bad according to the character of the 'tutor'. If he was an energetic and learned man he attracted pupils not only from the non-conformist bodies, but from the Anglican church itself. Many of them were famous for their rationalistic interpretation of the 'scriptural text'. The habit of criticism which led the students further than some of the supporters of these institutions approved. They became centres for the spread of Anti-trinitarian doctrines and the non-conformist contribution to the Unitarian body largely sprung from the 'Academies'. We hear of grants from the trinitarian non-conformists' funds being withdrawn, and in other cases of the students being compelled every six months to subscribe a Calvinistic statement of belief - a proceeding rather more stringent than the older Universities' enforcement of the 39 articles on their members.

However, what is clear is that Richard Price got his first bent towards Arianism from Vavasor Griffith's Academy. We are told that his father once found him reading a sermon of Dr Samuel Clarke, the broad churchman, mathematician and personal friend of Newton, and trans-lator of his *Optics*. Although Clarke remained in the Church, he was undoubtedly really of Arian belief and was a friend of Whiston, Lindsey, Emlin and other Unitarians. At the request of the Princess of Wales, afterwards Queen Caroline, he entered into a controversy with Leibnitz on the nature of space and time, Leibnitz taking the view that they were only imaginary, while Clarke supposed them real and necessary consequences of the existence of God. From space and time the controversy extended to Freewill. Clarke was a very imposing figure of the first quarter of the 18th century, one of the Cambridge men and mathematicians who stayed in the Church, although really rejecting its dogmas. It was said by Voltaire that Clarke missed an archbishopric, because Bishop

Gibbon told Queen Anne that Clarke was 'the most learned man and most honest man in her dominions and had but one defect - he was not a Christian'. Anyhow, young Richard Price studied Clarke's sermons, which his father observing seized the book from his son's hands and cast it upon the fire, reproaching him for his want of faith and of true belief. There is little wonder that the boy gravitated from Calvinism to the more liberal faith of Vavasor Griffith and Clarke. On the death of his father, Richard Price's mother and her children were left badly off. Richard was left only £400, which he at once gave to his mother and sisters. He determined to come up to London and continue his studies, and applied to his rich half-brother John for help. John said he would lend him a horse as far as Bristol and sent a servant with him to bring it back. From Bristol Richard started to walk to London, with his bundle over his shoulder and an occasional lift in a passing wagon. Arrived in London, Richard went to the house of his uncle, Samuel Price, a strict Calvinistic minister like his brother Rees. It is reported that his uncle, the conversation turning on controversial subjects, once asked Richard if he believed in the proper divinity of Jesus Christ; whereat Richard replied in the negative, if by proper divinity his uncle meant the equality of Jesus Christ and God. This caused his uncle to exclaim 'that he had rather see him transformed into a pig, than that he should be brought up to be a dissenting minister without believing in the Trinity'. Thus it was that the dissenters who objected to the bondage of the Anglican Church, in their turn tried to bind down to a narrow faith the next generation advancing in its turn beyond them. Samuel Price, however, sent his nephew to the Fund Academy of which the tutor was Newton's friend, the mathematician, John Eames. In Tenet Lane, Moorgate, Price probably made the acquaintance of Bayes, and both were probably reared in the same atmosphere of Newtonian ideas by Eames. Price did not live with his uncle, although the latter probably provided for him, but he lodged in the house of a barber in Pudding Lane. The putrescent vapours of the Lane and the insanitary conditions of the barber's dwelling affected Price's health, and he had to return to Wales to recuperate. On his return he got better quarters and devoted his whole time, as he expresses it, with ardour and delight to Eames' instruction in mathematics, philosophy and theology. When he had completed his time at the Academy, on the recommendation of his uncle he was appointed private chaplain to a certain Mr Streatfield, at Stoke Newington in 1744, with whom he remained nearly 13 years. During this period he officiated at the old Jewry and became assistant to Dr Chandler, but his fervour in delivery led to rebukes and he was ultimately relieved of his curacy by Chandler.

Yet Price seems to have learnt much from Chandler especially his doctrine of miracles, namely that they are to be accepted and believed if they give support to a messenger or prophet of God, who is teaching just and rational views of the divine attributes or a doctrine which leads men to the practice of virtue and true goodness. Thus the credibility of miracles is made to depend not only on the evidence for them, but on their giving support to a person who has a sound doctrine to teach. It is obvious that by emphasising the words 'sound doctrine' we have a loophole to include any convenient miracles and exclude those which are inconvenient, such as those claimed for the Saints of the Roman Catholic Church. Chandler and Price both made use of this principle not only to accept the miracles of the Old and New Testament, but

the pre-existence and resurrection of Christ, i.e. Arianism. In due time both Samuel Price and Mr Streatfield died, leaving nephew and chaplain a modest competency. As a consequence Price, in 1757, married Miss Sarah Blundell, a member of the Anglican Church, who remained so till her death, a sure sign of the toleration of both Price and his wife. The newly married couple went to live in Hackney, and here in 1758 at the age of 35 Price thought out his first book, *A Review of the Principal Questions and Difficulties of Morals*. This work was written between the end of his chaplaincy to Streatfield and the beginning of his pastorate at Newington Green, to which he was called in 1758 and where he and his wife moved in the same year.

[Note by E.S.P. While retaining K.P.'s account of Price's contribution to the History of Statistics, I have felt it necessary to reduce certain sections of this lecture dealing with Price's ethical views. As a start I have omitted here the discussion of what K.P. himself described as this "very obscure" "Treatise on Morals". I quote only the following two relevant sentences from K.P.'s discussion: "Fulfillment of the moral law requires not only the reason, but the liberty to fulfil it and the intention to do so. It is from this aspect of morality that Price starts when in the case of the American and French Revolutions he demands liberty for all citizens, for without it they cannot act morally." Now to continue with some more incidents from the life of Price:]

We have now to regard Price as settled into a comfortable home at Newington Green, two doors from Thomas Rogers, the father of Samuel Rogers, the poet, and also the father of Martha Rogers, Mrs Towgood, whose daughter, Maria Towgood married the son of William Morgan, Price's nephew. Most of the anecdotes given by William Morgan, in his *Life of Price*, by Miss Caroline Williams in her *A Welsh Family*, which deals with the descendants of Rees Price and their offshoots, and by Mr Roland Thomas in *Richard Price, Philosopher and Apostle of Liberty* are ultimately taken from an unpublished manuscript by Samuel Rogers containing notes for a life of Price. These anecdotes give a pleasing picture of Price, and the love of the young Rogers children for him. He once went for a walk in the country and came across some birdcatchers' nets with larks in them, he let out the larks and continued his walk, but his conscience struck him that he was perhaps depriving the men of their livelihood and he went back and placed a sum of money in the net.

He was fond of riding and always rode a white horse; as the doctor was seen approaching the City from the village of Newington Green, the costers would cry out 'Make way for the Doctor', but this was in the days when he had become a political celebrity, and was regarded as the apostle of freedom and the friend of the people. While Price took much from the French, particularly the idea of a state contract from Rousseau, he gave a great deal back to them, and Condorcet, whom we shall soon have to consider as one of the first to apply the mathematical theory of probability to social problems, speaks of Price 'as one of the formative minds of the century'. He could fight vigorously for freedom in America, France and England, he could help John Howard to

write his book on Prisons, or discuss with Lord Shelburne the means of ending the American war, but he could also on a walk retrace his steps to restore a beetle to its legs which he had passed half-unconsciously a few minutes before, or he could come down a second time to supper, having entirely forgotten that he had supped an hour before. When engaged in conversation he turned his wig round on his temples, twisted one leg round the other and folded his cocked hat into a thousand shapes.* Yet Priestley says of him 'He who can have and truly enjoy the society of such a man as Dr Price cannot envy the condition of princes'. The friendship of these two men is a memorable one. They differed on most points - on the freedom of the American colonies excepted - yet their controversies on theology and morality were always conducted with mutual respect, and Price contributed largely to Priestley's advance in life, and like Lindsey took up the cudgels for Priestley after the latter had sought a refuge in America.

But Price's friendships extended not only to Priestley; Lord Shelburne was a close personal friend, Pitt consulted him. He knew, not as acquaintances but as close friends, all the liberal thinkers of his day, Benjamin Franklin, Thomas Jefferson, John Adams, David Hume, Adam Smith and Andrew Kippis, the author of the great *Biographica Britannica*, Lord Lyttleton and the Earl of Chesterfield; Condorcet, Neckar, Turgot and St Etienne, among Frenchmen of distinction. He had friends in the Anglican Church and at the Oxford Colleges. At least three Bishops were his intimates, and when the Duke of Cumberland told Price that he had read his *Essay on Civil Liberty* till he was blind, Lord Ashburton who was standing by interjected, 'It is remarkable that your Royal Highness should have been blinded by a book which has opened the eyes of all mankind'. Price's simplicity of manners, his modesty and his originality made him welcome in all circles, high and low, and only in the cartoons and political pamphlets of the day is his character distorted to stir up party rancour. In the Meeting House under Price at Newington Green sat the Rogers family and in the next pew Mary Wollstonecraft - then a girl, destined to become the protagonist for women's freedom, and to be the mother of Mary Shelley - one of the few remarkable women of that date, who doubtless interpreted Price's sermons on civil liberty not only to be applicable to white men and negroes, but to her own sex. Here too, came for occasional sermons the heads of the Whig party and as we have seen the President of the Royal Society. From this little meeting house and from the Gravel Pit Meeting House in Hackney to which Price passed in 1770, came the sermons which appealed to world audiences.

In 1767 or '68 Price issued the first edition of his *Four Dissertations*. The first of these on *Providence* essentially adopts the Newtonian standpoint of an omnipresent Deity occupied in every particular case in controlling the course of events. He suggests that this does not interfere with natural causes operating uniformly and steadily. Men are usually impelled to action by the ideas that come into their minds. These

*Quotation from p. 10 of F. W. Claydon's *The Early Life of Samuel Rogers*, 1887.

†See Addendum regarding Price and Paine, on p. 377 below.

ideas direct their course of action, but why ideas and thoughts come into men's minds we know not. Thus Price suggests that by invisible agents the Deity can consistently with the laws of nature and the liberty of mankind direct all occurrences in such a manner that nothing unsuitable in any case shall come to pass. In the second section of Price's work we have a vigorous discussion of natural phenomena, and the author produces evidence for the existence of an activating deity, citing Newton's view that the ultimate causes of mechanism cannot be mechanism, but must be something of a different order, e.g. mind. He cites Newton's laws of motion, the inertness of matter, and says it is quite impossible for inert matter to know how it ought to respond to other matter at an immense distance from itself. In fact action at a distance was impossible as an idea, and Price suggests that if we accept an aether as producing the observed effect, we should only push the difficulty one stage further by asking how the elastic properties of the aether arise. In conclusion, Price asserts with Newton and MacLaurin that the Deity pervades and actuates the whole material world, and that his unremitting energy is the cause to which every effect in it must be traced. And this is true not only of the material but of the spiritual world also. He directly emphasizes the Newtonian as against the Leibnitzian view. He tells us that he 'chooses' to conceive of the direction of events as produced by constant influences rather than by an original establishment. It is clear that on this Newtonian hypothesis active interference of the Deity is at every instance possible and Prayer may have an objective as well as a subjective influence. But as we have been created 'short sighted and fallible'... 'we cannot in particular cases determine in what Manner [divine] influence has been exerted or what its intentions are' (pp. 88-91). In this way, by asserting that the extent of divine interference is unascertainable by us, and according to him wisely so, Price saves the freedom of the will, the response to prayer and the liberty of the activating deity. Like Derham and Nieuwentijt, Price uses much argument for the order in the Universe as evidence of Divine Providence, and where we do not see order it is because being mortals our views are too confined. It does not appear to have occurred to him that it is needful to define 'Order', and that even what he would call disorder may appear 'order' if looked at through the glasses and lenses of the human mind, just as a jumbled mass of broken bits of glass becomes a most elaborate pattern of orderly colours, if observed by aid of a kaleidoscopic system of two plane mirrors. It is just as possible to argue that the order of nature is produced by our instruments of perception, as that the disorder of nature is due to their failure. This is not the place or time to enter at length into Dr Price's metaphysics, like all metaphysics it can be refuted by a new metaphysics, and as no theologians are ever in perfect agreement, so no two metaphysicians ever are. Much of his metaphysics seems now argument in a circle, but it produced a great effect on the philosophers and inquirers of his own day, and brought him many friends and followers. Notable in this respect was Lord Shelburne who, having read Price on *Providence*, sought his acquaintance.

APPENDUM I (see p. 375)

Price and Paine

[Note by E.S.P.]

Professor William Kruskal of the University of Chicago who has told me that he wonders whether K.P. was justified in including the name of Paine among Price's 'close' friends. He points out that the two men were of very different character and temperament. While it is certain that they must have come into contact over their support for the American fight for independence and, later, in welcoming the French Revolution, it is clear from Chapter V of Part II of Paine's 'The Rights of Man' (1792), that Paine was either unaware or ignored all the attempts which had been made during the previous 100 years to collect reliable data on the distribution of ages at death and other demographic statistics. Price in his book on 'Reversionary Payments' (2nd ed. 1772) referred to below, recognized the existence and importance of mortality tables. He had himself (in the Supplement to this second edition) proposed a scheme of old age pensions, starting at 55 or 60 (preferably the latter) and payable by the local authorities; in 1773 a bill on these lines with suitable tables was passed through the House of Commons, but turned down by the House of Lords. This occurred again in 1786. On the other hand we find Paine in 1792 concluding that pensions should be paid at age 50, and estimating by 'counts made in the street' that only 6% of the population exceeded that age, whereas life table estimates gave the fraction as nearer 16%. Obviously the difference in the amount of funding money needed would be very different for these two estimates. To quote from a letter of Kruskal's dated 14 March 1974:

I recently ran across some letters to Price from John Adams, our second President. He despised Paine ('a blackguard, unprincipled') and apparently was on splendid terms with Price. This is consistent with my surmise that Paine and Price had such wholly different characters that they shunned each others' company, even though they must from time to time have been thrown together by their common views about the American and French revolutions.]

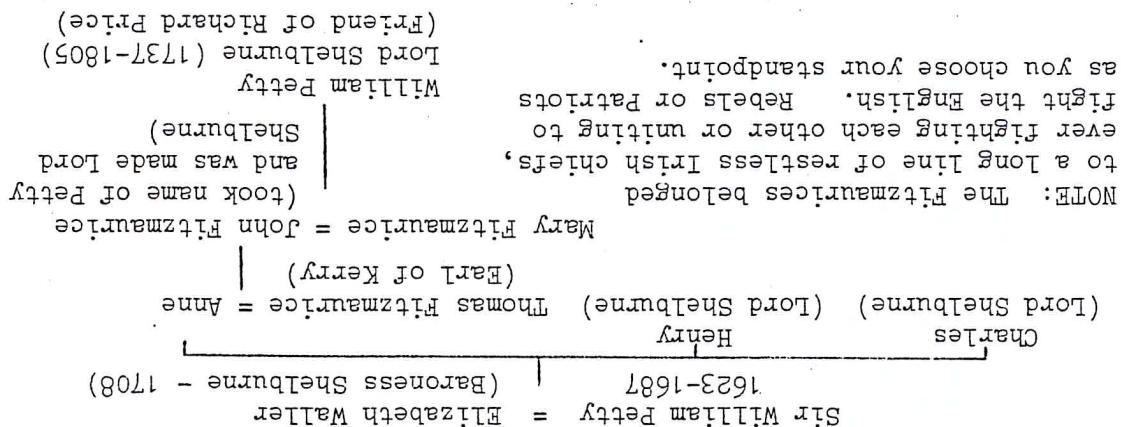
APPENDUM II (see pp. 375, 376, 381 etc.)

Some notes on Lord Shelburne, great grandson of Sir William Petty

Thomas Fitzmaurice, first Earl of Kerry, married Anne, daughter of our old friend and statistician, Sir William Petty. Petty's wife was daughter of Sir Harbress Waller, the so-called regicide. This lady was created Baroness Shelburne by James II (1688). Thus the interloper Petty, with his 30,000 acres acquired in Kerry, was linked up with one of the old Irish families of Kerry. Petty's two sons became successively Lord Shelburne but died without issue. The Petty estates therefore devolved on the son of Petty's daughter Anne, John Fitzmaurice, who took the name of Petty, Petty-Fitzmaurice. His son William Petty was again created Lord Shelburne. It is with this William Petty (1737-1805), great grandson of our Petty, that we are concerned. He is said to have

remarked that 'whatever degree of sense may have appeared in it [the Fitzmaurice family. K.P.] or whatever wealth is likely to remain in it' was brought in by Anne Petty who inherited the practical common sense and ability of her father. I am the more inclined to think that the influence of William Petty, Earl of Shelburne, was considerable with Price, because it was at Bowood that Price met the French revolutionists, and thus was urged forward on his third great political step. At any rate, before Price's work on 'Providence' had started his friendship with Shelburne we have no evidence that his thoughts turned to political action at all.

PEDIGREE OF THE FOURTH LORD SHELburne



10.5 Price's Dissertation on the nature of historical evidence and on miracles

I have wandered far from Price's Four Dissertations of 1768, but they were a great factor in his after-career. I am not sure that they did not in other respects influence his later work. From being a rather ineffectual teacher, they gave him reputation as a theologian with a new view of morals and religion. People of importance began to flock to Newington Green to hear Price, the man who had stood up to David Hume.

Once admit an activating, omnipresent deity with a perfect sense of rectitude - where rectitude is interpreted in a human sense - and it was possible not only to demonstrate the advantages of prayer, but to see that virtuous men must expect a state of happiness after death, for pain or suffering here below. But the last Dissertation like the first is of greater interest as having brought Price into touch and friendship with David Hume. It is entitled: *The Importance of Christianity, the Nature of Historical Evidence, and Miracles*. This dissertation reveals Price's standpoint with regard to revealed religion more clearly than anything else I have read. He considered that the revelations lately made in the system of the material world, i.e. Newton's discoveries, are things to be justly thought of with admiration but that 'they are of no consequence and deserve no regard compared with the discoveries to be made in the Bible', because these concern the moral world and the history of Providence. Above all the Bible gives us information on the point we so much desire to know about, namely death. Here Price accepts the orthodox view and tells us that death was not an original part of the

divine scheme, but a calamity in which our race has been involved. We learn, he tells us, the causes which introduced it and of the stupendous dispensation of providence which it has occasioned. Price next shows his Arianism, by speaking of the Great Messiah, through whose agency God created the world and through whose action death will be - at any rate for the virtuous and worthy - ultimately abolished. The principle of 'self-love' demands that we should fully consider the statement, for to reject it would be worse than throwing away the title-deeds to a great estate. Here Price is much beyond his age, for he says that the more infidels and unbelievers exert their strength, the more it leads people to investigate the truths of revealed religion, and to subject such infidels to prosecution, the pillory and confinement in Bridewell, even if they write scurrilously, is wholly unworthy of a protestant country.

The civil magistrate ought not to interpose in the defence of truth, till it has appeared that he is a competent judge of truth. This, certainly, he is not. On the contrary; universal experience has, hitherto, proved him one of its worst enemies. Nothing can be more disgraceful to the christian religion than to suppose that it needs such assistance. (p.367)

I do not propose to enter into all Price's arguments, but he recognises that the claims of the Messiah depend upon miracles and these miracles on the credibility of their witnesses. Biblical account of the origin of death and the redemption from death by an individual, Price admits can only be substantiated, being so miraculous in itself, by attested miracles. He accordingly finds it needful to reply to Mr Hume, 'a writer whose genius and abilities are so distinguished, as to be above any of my commendations' (p.382). Hume has said that:

A miracle is an event, from the nature of it, inconsistent with all the experience we ever had, and in the highest degree incredible and extraordinary. In the falsehood of testimony on the contrary, there is no such incredibility, scarcely anything being more common. No regard, therefore, can be due to the latter, when it is applied as a proof of the former. . . . It is, [says Hume. K.P.] a maxim worthy of our attention, that no testimony is sufficient to establish a miracle, unless the testimony be of such a kind that its falsehood would be more miraculous than the fact which it endeavours to establish. (Essay on Miracles)

It is the balancing of one miracle against another, upon which Hume drives us. How does Price meet his doughty opponent? He says that we must consider first the foundation of our assurance based upon experience of the laws of nature. This assurance he tells us is nothing more than the conviction we have that future events will correspond to past ideas based upon instinct but a measure of the expectation of repetition of experience. What we want, according to Price, is not an association of ideas but we do not know what they are. But, says Price, we have no certainty, if a die has cast an ace a million times we expect its faces are all aces, only a probability. Here Price directly appeals to Vol. 53 of the *Philosophical Transactions*, i.e. to Bayes' Theorem, and asserts that that Theorem provides us with a measure of the probability of future events confirming past experience. We have, he writes, no absolute proof, but only a probability of recurrence in a future trial, nor have we the least

reason to believe that an event will always happen. In a long footnote Price cites from the Bayes' Theorem Memoirs, and states as against Hume that it is very inaccurate to speak on this subject previously to calculation. Having thus by aid of Bayes loosened our confidence in the uniformity of natural events, Price endeavours to strengthen our confidence in human testimony. He says it is not a question of determining how many men speak truth and how many do not, or how often a given man speaks truth and how often not. One conversation with a man may convince us of his integrity and a man's method of writing his story may convince us of its truth. [This is rather dangerous ground, for it may not be adequate to convince another man. K.P.] Having worked himself up to this point Price continues 'We are not so certain that the tide will go on to ebb and flow, and the sun to rise and set in the manner they have hitherto done, a year longer, as we are that there has been such a man as Alexander, or such an empire as the Roman.' Is this quite to the point? - We all are certain that there was an Emperor called Karl the Great, but within 50 years of his death a monkish writer has told us of the many miracles he performed. We accept Karl the Great as we accept Alexander, but we do not necessarily accept miraculous events attached to their lives, any more than we believe Rome was built in a day. Still appealing to the theory of probability Price makes good some points against Hume. If two dies are thrown and both turn up sixes, the improbability of this is $1/36$; in a lottery of 1000 numbers the chance of drawing a particular number is $1/1000$ a priori, either of these events is very improbable, but some event must turn up, and because a person reports this single and very improbable event as having actually happened, are we to doubt his testimony because the result was a priori improbable and its probability less than that of testimony being true in general? - Clearly the weight to be given would be to the a priori statement that it would turn up, but having turned up, we should not doubt the witness. Here again, however, I think Hume might reply to Price that the lottery must turn up some number, there is no improbability in that, but the improbability comes in when a particular number is selected before-hand. The miracle is not one of certain things which must one or other of them happen, but something which a priori is not in the bag, i.e. a number 1001 when we have put 1 to 1000 only into the bag. When we come down from these somewhat obscure applications of the theory of probability to the miraculous, we find the good Dr Price asserting that we believe extraordinary facts because they are blended with common facts and are told with so much the appearance of a like artless simplicity in both cases (p. 427). Surely the same argument would apply to the miracles of Gautama, the Buddha, to the naive accounts of many primitive religions, or to narratives of modern spiritualistic seances? They are over and over again told with a 'like artless simplicity'.

Miracles deny the impossibility

Of certain events

10.6 His political, economic and actuarial papers

But these metaphysical works of Price, although indicating his limitations and his character, are detaining us from works having more bearing on our subject. Lord Shelburne wished that Price would leave his theology and turn to politics, and whether he succeeded in influencing Price or not, it is certain that Price now did begin to publish political and economic papers. The first works that we have to consider are:

- (A) 'Observations on the Expectations of Lives, the Increase of Man-kind, the Influence of Great Towns on Population and particularly the state of London with respect to the Healthfulness and Number of its Inhabitants.' In a letter to Benjamin Franklin Esq. LL.D. and F.R.S. April, 1769. *Phil. Trans.* Vol. LIX (1769) pp. 89-125.
- (B) 'Observations on the proper Method of calculating the Values of Reversions depending on Survivorship.' *Phil. Trans.* Vol. LX (1770) pp. 268-76.
- (C) *An Appeal to the Public on the Subject of the National Debt*, London (1771).

I shall deal first with (C). A second edition with an 'Appendix

containing *Explanatory Observations and Tables*; and an Account of the present state of Population in Norfolk', appeared in 1772 and another edition in 1774. I have used the second edition.

This work was issued two or three years after Price had made Lord

Shelburne's friendship. The question of the National Debt and its

effect on trade always arises after a great war. In 1716 a sinking

fund for the National Debt had been established and in repeated laws it

had been declared that it should only be used for the purpose of paying

off the National Debt. Davenant had written strongly on the danger of

the Debt and Price was now taking up the same cry. But the sinking

fund has always been raided by all ministries in succession when they

have had urgent need for money. The English Sinking Fund as instituted

by Sir Robert Walpole in 1716 was declared inalienable. Notwithstanding,

from 1718 onwards it was constantly made to pay the interest on newly

borrowed money.

Price defines a sinking fund to be 'any saving or surplus set apart

from the rest of an annual income, and appropriated to the purposes of

paying off debts'. He says there are three ways in which a kingdom may

apply such a saving:

1st The interests disengaged from time to time by the payments made with it, may be themselves applied to the payment of the

public debt.

2nd They may be spent on current services.

3rd They may be immediately annihilated by abolishing the taxes

charged with them.

Now Price clearly considers the first method the best. He com-

putes its effect by compound interest and asserts that if the nation

sets apart £200,000 per annum, £262,000,000 of debt will be paid off in

86 years. In fact he says that the sinking fund, however small, will

ultimately pay off any debt, however large - always reckoning by compound

interest. He asserts that this is done at no greater expense than £200,000. But he seems to quite overlook the fact that the taxpayer has to pay 5% on that £262,000,000, say £13,000,000 annually, and accordingly in 86 years will have paid some £1,127,000,000 in interest and some £17,200,000 to keep up the sinking fund. Nor is this all; the taxpayer might himself have put out at compound interest all this money he has had to pay. The efficiency of a compound interest sinking fund appears therefore to arise from its enforcing continuous payment up to the hilt from the taxed people, i.e. they would find no reduction from their burdens until 86 years were out, i.e. until they were all in their graves. It seems to me that this method of saying that a debt of £262 millions can be paid in 86 years by annual sum of £200,000, is to overlook totally that the public is contributing an additional £1,127,000,000 and losing its own chance of compound interest on that sum. This point I cannot see that Price has met, and not meeting it, it is perfectly easy for him to argue that a sinking fund applied in the first way is omnipotent, but treated in the second or third way is feeble or barren (p.11).

Price was very much moved by the effects possible to compound interest.

One penny, [he writes] put out at 5 per cent compound interest at the birth of Christ, would, before this time, have increased to a greater sum, than would be contained in a hundred and fifty millions of earths, all solid gold - But if put out at simple interest, it would in the same time, have amounted to no more than seven shillings and sixpence halfpenny. Our Government has hitherto chosen to improve money in the last, rather than the first of these ways. (pp.18 and 19)

Price continues by indicating that the sinking fund was intended to be applied to reduce the debt in his first manner, but that between 1718 and 1731 nearly 9 millions were taken from it towards supplies. After stating that the raiding of the sinking fund is the fundamental grievance of the kingdom and that patriotism which is associated with a tyranny which could raid the sinking fund can be nothing but an imposture, he continues:

Unhappy Britain! - How long art thou to lie thus bleeding? - How long are thy dearest rights to be sacrificed to temporary expedients and a narrow and selfish policy? When shall thy parliaments recover independence and dignity and become once more awful to Ministers of State? (p.40)

More truth if less rhetoric is to be found in Price's main conclusion:

In a word; not only the preservation of our Trade and Liberties, but the very being of the State depends at present on the reduction of our debts. (p.48)

The whole work concludes with a number of appendices and one of these deals with the decline of population in England. This may appear to have little to do with the sinking fund until we remember that Price holds that a heavy debt involves high taxation and high taxation forms a check on population.

The raiding of the sinking fund Price attributes to a succession of corrupt ministries, and here his eloquence reaches a summit with which

we are not unacquainted in our own generation:

And if this indeed be true, if a succession of such wise and honest administrations is impossible, as is necessary to execute a plan that requires steadiness of counsel for a course of years; and if on this account, the kingdom must despair of ever seeing the sinking Fund permanently and efficaciously restored - then in the name of justice and humanity, LET IT BE EXPUNGED FROM OUR PUBLIC ACCOUNTS; and let us not be any longer mocked with the SHADOW of an invaluable blessing, once solemnly promised us; but which it seems, for want of public virtue, we can never enjoy. (p.52, Edn of 1772)

This paper of Price's on the National Debt attracted even more attention than his *Treatise on Morality*. It influenced especially Price's friend William Petty, Lord Shelburne, and when he became Prime Minister in 1782 to negotiate peace with America, he placed the redemption of the National Debt in the forefront of the King's speech. Later Pitt actually consulted Dr Price on the best form of sinking fund. Price drew up two plans of which Pitt selected the one Price considered inferior, and modified it considerably. William Morgan in his *Life of Price* (p.45) condemns Pitt for thus taking advantage of Price's advice and not acknowledging its source. But Pitt was a statesman who had to carry through the Commons what was feasible, and reference to such a firebrand, as Price was considered, might have hindered his achievement of any result at all. Price has received full measure of praise from later historians and it is highly probable that Pitt consulted other authorities as well as Price, and drew from the whole of his information not possibly the ideally best scheme, but the statesman's scheme, i.e. what was possible under existing circumstances.

The last appendix to Price's *Appeal** deals with the decrease in population asserted to have taken place during the 18th century in England. Price cites Davenant to show that in the 17th century the number of houses had increased, but compares Davenant's data for 1759 with those for 1766:

	1759	1766
Houses inhabited, in charge	679,149	678,915
chargeable	24,904	25,628
Cottages, discharged for		
poverty only	282,429	276,149
	986,482	980,692

Davenant thus concludes that in seven years there were 5790 houses fewer, and going back to 1690 when the houses were 1,319,215, reckoning at 5 [? 4.5 M.V.P.] persons per house he states that there were 'near 1,500,000 persons' (332,733 houses) less in this country. It is quite possible that emigration had lessened the number of persons in this country, but the change between 1759 and 1766 is entirely in country cottages, and it is quite conceivable that five persons to a house in the larger towns was not a reasonable average. Arguing from number of

*Extract from the Supplement to a treatise entitled *Observations on Reversionary Payments, etc.*

houses to size of population is almost as risky as arguing from number of deaths to size of population. Price, to confirm his views, quotes the statements of a gentleman who knows Norfolk well and who gives his impressions with regard to that county and those of Suffolk and Essex. These are largely mere impressions and point in general to a loss of rural population. For example there were parishes with spacious churches with two aisles, the population now consisting of a single family or two or three; at least 30 parishes now known consisting of only a single family, and probably 100 parishes with less than ten families, where the church had seating for more than 100 persons. He points to the ruins of cottages* and small farmhouses all over the country. He points out, however, that the small farms did not make provisions cheap, for they consumed their own produce, while the large farms exported wheat to London and to foreign countries. The instances cited seem to suggest a difference in the method of agriculture and landowning, which led to less need for labour and labourers' cottages and to the crowding of the population into towns. The Norfolk informant holds that the bad economic condition of the country had led to its depopulation, and this may be the source of Price's own views on the relationship of National Debt and Population. A good deal of Price's population work is based on the primitive conception of John Graunt that a measure of population may be obtained from the number of deaths in a given locality.

We will now deal with the Royal Society paper ((A) of p. 381 above), published in the *Phil. Trans.* Vol. LIX, 1769, pp. 89-125: 'Observations on the Expectations of Lives, the Increase of Mankind, the Influence of Great Towns on Population, and particularly the state of London with respect to Healthfulness and Number of Inhabitants.'

It is noteworthy that - although he was a Fellow of the Royal Society, as a result of his presentation of Bayes' papers - Price does not directly present his own paper, but communicates it in the form of a letter to Benjamin Franklin [April 1769] and asks him to communicate it, if he thinks the observations of any importance. Price starts by saying that he considers that the right method of dealing with health and population from the bills of mortality has been considered by others, but the proper method of calculating from the bills has not, he thinks, been sufficiently explained. 'No competent judgment,' he continues, 'can be formed of the following observations without a clear notion of what writers on Life Annuities and Reversions have called the "Expectation of Life".'

He holds that De Moivre had not clearly expressed himself on this point. It seems to me that it is Price who does not clearly express himself. The usual interpretation of the 'Expectation of Life' is the mean after life time of a person of a given age, and I should say that this definition was of most value in actuarial practice. We have seen, however, that Deparcieux and Buffon used another conception, namely the age at which half the people living at age x would still be alive. We have the median idea and not the average after life time. Price says that

*The informant cites deaths in Norwich on 'annual medium' for ten years 1739-1749 : 1220; 1749-1759 : 1241; 1759-1769 : 1154; and states that Norwich must have once been much more populous 'as it is related' to have lost more than 50,000 people in one year by the plague'. (p. 89)

The most obvious sense of the expectation of a given life is the particular number of years which a life of a given age has an equal chance of enjoying. This is properly the time that a person may reasonably expect to live; for the chances against his living longer are greater than those for it, and therefore he cannot entertain an expectation of living longer, consistently with probability. (p.90)

Mr George King, without referring to Price, has justly criticised the vagueness of such terms as 'reasonably expect to live' in the *Institute of Actuaries Text Book* (Part II, Edn 1887, p.29).

If we take such a mortality table as Halley's, however, the mean after life time and the median life time are very close, and absolutely coincide on De Moivre's hypothesis, that one individual a year dies till the whole are extinguished. Much injustice has been done to De Moivre in this matter by later writers. Thus Mr Roland Thomas, the author of the most recent account of Price, writes that De Moivre constructed 'a table about 1750, but based it on a hypothesis of his own and not on known facts' (p.52). There are at least three blunders in this short quotation. De Moivre's treatise on *Annuities* appeared in 1743, its second edition only in 1750, the table is not De Moivre's but Halley's and the hypothesis was an exceedingly good approximation to the then known facts. Morgan, Price's nephew, makes similar remarks laudatory of his uncle at the expense of De Moivre, but Price himself writes of De Moivre's hypothesis: it is

an excellent hypothesis. It eases exceedingly the labour of calculating the value of lives. It is remarkably agreeable to Dr Halley's Table of Observations; and, as far as it implies an equal decrement of life, is, in a great measure, confirmed by other Tables. (p.91, footnote)

Price continues by pointing out that the mean after life time which is the more important idea for insurance practice is not equal to the median life time except on De Moivre's hypothesis. In a footnote he proves by a rather crude fluxion analysis several results which De Moivre had given in his *Annuities* without proof. For example, if we have two unequal lives with complements m and n , $m < n$, then the chance of survival to x is

$$\frac{m}{m-n} \times \frac{n}{n-x}$$

and Price converts this into the integral

$$\int_m^0 \frac{m}{m-x} \times \frac{n}{n-x} dx$$

$$= \left[x \frac{2}{x} \left(\frac{1}{1} + \frac{n}{m} \right) + \frac{3mn}{x} \right]_m^0 = \frac{2}{m} - \frac{m}{2} \\ \text{which is the 'expectation of two unequal joint lives'.}$$

The 'expectation of survivorship' of the elder is

$$\frac{2}{m} - \left(\frac{2}{m} - \frac{m}{2} \right) = \frac{m}{2}$$

and of the younger

$$\text{Hence expectation of joint survivorship is } \frac{n}{2} - \left(\frac{m}{2} - \frac{6n}{2}\right) = \frac{n}{2} - \frac{m}{2} + \frac{6n}{2}.$$

$$\frac{n}{2} - \frac{m}{2} + \frac{3n}{2}.$$

Price suggests that De Moivre's results of this kind can be extended to any number of joint lives.

We have already seen, when dealing with Simpson, that if a population be stable the knowledge of a mortality table and of the actual number living at any age, will by a mere ratio determine the total population of a town or country.

Thus Simpson proposed multiplying the whole number in the mortality table by the ratio of the observed births to the number of births in the mortality table. In a stable population the number of entrants must be equal to the number of leavers - the births to the deaths - and thus we may work with deaths as well as births. Unfortunately few towns provide data in which these records are the same, and much of Price's memoir is devoted to various hypotheses for bringing them into something like accord for the case of London and so establishing its total population.

Always assuming stability, Price's paper provides a number of ways in which the mortality table might be used to give interesting results.

Thus (p.95), De Moivre had shewn that the expectation of two joint equal lives is one third of their complement of life

$$\int_n^0 \frac{n-x}{n-x} \cdot \frac{n}{n-x} dx = \left[\frac{3n^2}{(n-x)^3} \right]_n^0 = \frac{3}{1} n.$$

Thus two persons marrying at 29 might, with De Moivre's 86 as limit, expect 57/3 years = 19 years of common married life and if there were 20 such marriages every year of these ages, we should expect in 57 years, 20 x 19 or 380 marriages existing together.

Again, since the expectation of a single life is one half its complement, 20 single persons aged 29 added to a town would increase to 20 x 28.5 or 570, and when arrived at this number the deaths every year would equal the accessions and there would be no further increase. In this way Price gets some interesting suggestions which are not unrelated to those made by Professor Westergaard in this lecture theatre about a year ago.*

Thus if 1/19 of the marriages among a group are dissolved every year by the death of either husband or wife, then 19 years was 'the expectation of the duration of those marriages'. If the 28th part of a group of any age dies annually then 28 was their common expectation of life at the time when they entered.

Price illustrates such results on Halley's and Simpson's Tables.

* College records show that this well known Danish statistician, formerly Professor of Political Economy in Copenhagen gave two lectures in the Department of Applied Statistics at University College on some dates during the year March 1925-March 1926. E.S.P.]

He does not seem to have realised that there is something very obscure about Simpson's table and that it is probably faked. Thus from Halley's Table the sum of all persons living at 20 and upwards is 20,724 and the number living at 20 is 598, giving $20,724/598 = 34.15$ as expectation of life at 20. Simpson's Table gives 28.9 (p.97). Price sums up his method as the reversal of this process, i.e. find from the table the expectation of life at birth and multiply by the number of yearly births and this will be the total population. Here Price emphasises the importance of using the mean and not median value of 'expectation'. From Halley's Table he finds expectation at birth to be 28 years and this multiplied by the annual births, 1238, gave 34,664 as the population of Breslau.

Price now applies Simpson's Table to compute expectation of life at birth and finds it 20 years, while the annual number of births in London is 15,710, which gives a population of 314,200. The burials were 22,956. Price supposes therefore that 22,956 - 15,710 were the immigrants to London, i.e. 7246. He gives these an expectation of 30 years, supposing them to enter at 18 or 20 years. This gives him an additional population of $7246 \times 30 = 217,380$ or a total population of 531,580, which he thinks would be the population at most were the data for births and deaths perfect. But he says they certainly are not, as many burial-places are not in the bills and many births are not recorded. He supposes a 6000 defect in births and a 6000 defect in burials, but gives no reason for these and makes the whole number of inhabitants 591,580 and again 4000 in births and 6000 in burials, and reaches 591,580 and 671,580, respectively. His method of reaching a measure of immigration is ingenious, but I see no justification for his numbers of 6000 or 4000, and further he assumes expectations as given by the very doubtful Simpson table to have real value. On the whole he concludes that his number of 671,580 'though short of the number of inhabitants commonly supposed in London is very probably greater and cannot be much less than the true number' (p.162). Dr Brakenridge in the *Phil. Trans.*, Vol. XLIX, in 1755, had fixed the number of inhabitants as 751,800, but Price holds that his method of determining the number of houses was too precarious and that the Doctor's six persons to a house was too large an allowance. Price criticises also Brakenridge's statement that 1 in 34 inhabitants die annually, and holds that 1 in 22.5 is more like the true number. There was a good deal of data at this time as to (i) the number of persons to a family and (ii) the number of persons to a house and Short had actually collected statistics of this nature on 14 towns and 65 country parishes and found $\frac{1}{2}$ to $\frac{4}{3}$ persons to a family and $\frac{5}{4}$ to $\frac{3}{4}$ to a house. Hence Price concludes that six to a house was too many and that five to a house was right for London. All this discussion, however, is very much in the air, and the number of persons to the house can vary very much with locality and period. Price also criticises Corbyn Morris's statement that the number of inhabitants in London was near a million. Corbyn Morris (d.1779) had supposed only a 60th part of the inhabitants of London above 20 to die every year. Price says that only a 24th part die according to Halley and a 29th part according to Simpson, while of 974 ministers and professors in Scotland a 33rd part die every year. According to Price a 30th part would be beyond truth and accordingly Corbyn Morris over-

stated the case by 400,000! Price agrees with Short and Brakenridge in the years 1717 to 1743, although it was beginning to rise once more in his own day. But here again, as now today, the tendency to live out-side London or the bills of mortality area had become very marked. On the whole it seems to me that most of these population estimates are guesses at random and Price's own although more elaborated is not very much better or likely to be truer than John Graunt's.

Price says that town life is so unfavourable to children that one half of those born die before three years of age, while in the country (citing Graunt) more than a half live to be married. He further cites Dr Heberden's data for Madeira (*Phil. Trans.* LVII, (1767), p. 461) to prove that 2/3 of those who die have been married and therefore that not as many as 1/3 of the population can die as children, and quotes this against the unhealthiness of towns. He does this as follows: for the years 1759-1766 the weddings have been to the births as 10 to 46.8 and to the burials as 10 to 27.5. Accordingly 20 to 46.8 and 20 to 27.5 are the proportions of those marrying annually to the births and deaths respectively. He then supposes one person in 20 to be a widow or widower at marriage and says the persons married annually are to the deaths as 19 to 27.5, or as he says 3 to 4. From this he concludes that three quarters of the population live to be married, which he says follows if the number of births and deaths are equal, appearing to assume that such is not only a necessary, but a sufficient condition of a stable population. Since for these data this is not the case, he says it is 'sufficiently evident that it [the proportion who live to be married. K.P.] cannot be much less than two thirds' (p. 111).

Price reaches this by the statement that the true proportion must lie between the two ratios 19 to 46.8 and 19 to 27.5, but I do not see why it is 'sufficiently evident' that it cannot be much less than 19 to 28.5, i.e. 2 to 3. What Price does not seem to realise is that $3/4 = 0.75$, $2/3 = 0.67$ and $19/27.5 = 0.69$ and is already nearer to the 0.67 than to 0.75, i.e. his first ratio is already $2/3$ rather than $3/4$.

But one point might be tested from modern data. Price divides the number of inhabitants of Madeira (p) by the annual number of a child just born, supposing the births constantly equal to the burials. He then divides the number of inhabitants by the annual number of births (b) and gets 29.35 and suggests that the true expectation of life must lie between 49.89 and 29.35 and says it must be really somewhere near the mean of these two numbers. Thus $p = \sqrt{(d+b)} \times (\text{expectation of life of a child at birth})$ or $p = \frac{1}{2}(d+b) \times (\text{expectation of life of a child at birth})$, according as we take the geometric mean or arithmetic mean - Price does not say which. Now the expectation of life must be fairly constant in an inter-censal period for a child and it might be just worth while testing such a formula from the census returns. It could be done fairly easily from the annual returns of births and deaths. The expectation of life at birth for a male is 41.35 and female is 44.62, from Farr's table.

In certain places Price recognises the need for stability as essential to his arguments. Thus (p. 113 ftn) he speaks of persons who consider the ratio of annual births to annual marriages as giving the average number of children derived from each marriage, and suggests that this is not true unless there be stability. But his idea of

stability appears to be the equality of birth and death rates. 'But,' he writes, 'this is true only when, for many years, the births and burials have kept nearly constant.' He points out that in the country births almost always exceed burials, but in towns the reverse is the case. He does not see that this may be due to the age distribution just as much as to the unhealthiness of the towns. He has no conception as yet - any more than had Güssmlich - of the need for standardised death and birth rates. He moralises:

So remarkably do towns, in consequence of their unfavourableness to health, and the luxury which generally prevails in them, check the increase of countries. (p.115)

He also says that towns are unfavourable to prolificness. The births to marriages in towns being seldom above four and generally between three and four and sometimes under three, while in the country they are seldom under four, generally between four and five and sometimes above five. Price states that is quite erroneous to suppose people live longer in London, and he then proceeds to quote some rather suspicious returns of the deaths of the aged in various country districts and in towns. The views Price held are much those of his time, and he writes:

The facts I have now taken notice of are so important that, I think, they deserve more attention than has been hitherto bestowed on them. Every one knows that the strength of a state consists in the number of people. The encouragement of population, therefore, ought to be one of the first objects of policy in every state; and some of the worst enemies of population are the luxury, the licentiousness and debility produced and propagated by great towns. I have observed that London is now increasing. But it appears that, in truth, this is an event more to be dreaded than desired. The more London increases, the more the rest of the kingdom must be deserted; the fewer hands must be left for agriculture; and, consequently, the less must be the plenty and the higher the price of all the means of subsistence. - *Moderate towns being seats of refinement, emulation, and arts, may be public advantages.* But great towns, long before they grow to half the bulk of London, become checks on population of too hurtful a nature, nurseries of debauchery and voluptuousness, and in many respects greater evils than can be compensated by any advantages. (pp.118-9)

So strong was Price on population that he wished to see the encouragement for marriage which had been adopted in France - such as ex-cusing married men from serving in the militia - introduced into this country. 'It is strange,' he writes, 'that in this kingdom some policy of the same kind with that last mentioned should not be pursued' (p.119). When he wrote this paper the American War was not thought of. He notes the very rapid increase of the population of New England and of the other American colonies, referring to a memoir by Dr Styles of Boston. He considers that these colonies are doubling their population in 25 years, but he points out that all such increases should really be treated as a compound interest problem.

Price concludes by urging (i) the registration of births, marriages and deaths with ages, and (ii) a census of all living in the kingdom with their ages and occupations. Petty and De Moivre had urged these same reforms before Price and 30 years later they were really carried out. The letter ends with a few lines of admiration and gratitude to Benjamin Franklin to whom it was addressed - just five years before the outbreak of the American War.

The memoir completed Price's reputation and yet it does not contain much beyond a more refined use of the methods of Graunt and Petty, or rather those of De Moivre. Further, Price's views as to the evil of great cities are essentially those of Short and Süssmilch. We may take here Price's further population work. It originally appeared as an appendix to his nephew William Morgan's *Doctrine of Annuities* (1779). It was fairly strongly criticised by William Eden (1744-1814) in his *Letters to Lord Carlisle*. This led Price to republish his work in the following year (1780) as a pamphlet entitled: *An Essay on the Population of England. From the Revolution to the present Time. With an Appendix containing Remarks on the Account of the Population, Trade, and Resources of the Kingdom, in Mr Eden's Letters to Lord Carlisle*. Cadell, 1780. Eden accused Price of being unduly biased by apprehensions concerning the public danger, notably the depressing effect of war against America, France and Spain.

Price's method of reaching the population of England is precisely that of his *Phil. Trans.* paper already discussed. Namely, he takes the return of houses from the accounts of the Surveyors of the House and Window Duties and then gives samples of censuses in small localities of different types, city and rural, to obtain the average number to a house. Finally he multiplies the number to a house by the number of houses and so reaches his estimate of population. Now in the first matter of taxable houses, Price deals with the returns for London, Southwark, Westminster and the County of Middlesex for 1758 and 1777, and we find that the total houses are 87,614 in the first year and 90,570 in the second year, showing an increase in the number of houses. But he points out that while the chargeable houses have risen from 68,290 to 77,008, the non-chargeable cottages have fallen from 19,324 to 13,562, and enlarges on the fact that the houses of the poor have decreased in number while those of the wealthy have increased. But surely the whole difference is due to the fact that in 1758, houses of seven windows were excused the tax, while in 1766 Parliament extended the tax to houses of seven windows and these became according to Price's classification houses of the wealthy and not cottages. It is true many of them at once bricked up a window in order to fall below the tax; but the result was a large decrease in the so-called 'cottages'. Anyhow the houses increased some 3000 in number in 19 years and Price admits a possible increase of 10,000 'substantial' houses in London in 20 years. He does not inquire whether 'substantial' houses have a higher average number of occupants per house than cottages. He says that the increase of houses in London has been the object of general observation. 'It deserves,' he remarks, 'particular notice that it is derived entirely from the increase of luxury; an evil which while it flatters, never fails to destroy' (p.4). He further asserts that the decrease of the lower people in London and Middlesex has kept pace with the increase of buildings. The only evidence he gives of this is the decrease in the burials and births as recorded in the Bills of Mortality. But here there was more than one cause at work,

namely huge parishes like those of Marylebone and St Pancras were growing up outside the area of the Bills, and people preferred to live in adjacent villages like Stepney, Hackney, Stoke Newington, Highgate, Hampstead and Baywater to living 'within the walls'. Further, he appears to overlook entirely the point that the decreased deaths may be to some extent due to the improved sanitary conditions which followed the rebuilding of London after the plague.

He also cites Davenant's account that according to the Hearth-books the number of houses in London, Westminster and Middlesex was 111,215 in 1690, and as they were only 90,570 in 1777, there was a decrease of 20,645 houses in 87 years, involving a corresponding reduction of population of between 100,000 and 120,000 in this area. But before we accept anything of this kind it would be needful to ascertain that a house was the same thing to a window-tax surveyor, as a hearth was to a hearth-tax collector. If there were many houses with two or more 'hearts', Price's loss of 20,645 houses is meaningless. Petty in his *Essays on Political Arithmetic* enters into this question of hearts (Hull II, p. 534), and shows how vague was all prediction from hearts to houses. Petty finds in Dublin 4.6 hearts to a house and in Bristol 3.1 hearts to a house. There were 388,000 hearts in London, and Petty says the mapmakers told him 84,000 houses, which would be 4.6 hearts to a house. It is quite clear that any estimate from hearts to houses is very vague at the best. Anyhow I frankly do not believe that the population of the London area decreased by 100,000 to 120,000 between 1690 and 1777. However Price now modifies his statement in the *Phil. Trans.* paper of 1769 and says the population of the London district being given there as about 651,000, he now holds it in 1777 to have been only 543,420, i.e. 90,570 $\times$ 6 (counting six to a house).

On pp. 6-8 he gives fairly numerous but very mixed returns, some on very small samples, of the number of persons per family and number of persons per house. In Nottingham a survey of 17,417 inhabitants led to $5\frac{1}{3}$ to the house and $4\frac{5}{4}$ to the family. In Manchester 27,246 inhabitants gave $6\frac{1}{4}$ to a house, and $4\frac{5}{2}$ to a family. In country parishes: Bala in Wales gave $4\frac{1}{2}$ to a house, while in Chippenham, Wilts, 5 to a house. In 14 market towns: population 97,611 gave $4\frac{1}{3}$ to a family, while 65 country parishes: 76,284, gave $4\frac{5}{2}$ to a family.

When Price comes to the population of England and Wales, he says there are 952,734 houses and that five persons to a house is 'too large an allowance'. Thus we reach his estimate of less than 5,000,000. Now let us look at the United Kingdom censuses, which began in 1801.

Census Year	Population	Inhabited Houses	Persons to House
1801	8,892,536	1,575,923	5.64
1811	10,164,256	1,797,504	5.65
1821	12,000,236	2,088,156	5.75
1831	13,896,797	2,481,544	5.60
1841	15,914,148	2,943,945	5.41
1851	17,927,609	3,278,039	5.47

We see clearly from these results that: five persons to a house is not too large, but too small an allowance. That under a million houses in 1780 would mean that in the next 20 years the number of houses had increased 50%!

If we consider population and houses to increase in geometrical ratios R and r , we have

	R	r
1811/1801	1.1430	1.1406
1821/1811	1.1806	1.1617
1831/1821	1.1580	1.1884
1841/1831	1.1452	1.1863
1851/1841	1.1265	1.1135
Mean $R =$		
	1.1507	1.1581

and mean number of persons per house = 5.61 for five censuses (1801-1841).

Hence we conclude as follows:

Extrapolated Population

	From r	From R (Houses $\times 5.61$)	Houses
1791	7,727,936	7,633,993	1,360,783
1781	6,715,856	6,591,823	1,175,013

It seems highly probable therefore that Price was a million and a half out in his estimate of population, perhaps 200,000 out in his statement as to number of houses, and more than 12% out in his estimate of persons per house! This does not give much confidence in methods depending on hearths and window tax collections.

Now while Petty desired to flatter royalty by exaggerating the population of London and England as compared with Paris and France, Price wished to prove that war and the very gross luxury he asserted to have existed had so burdened and depressed the English people, that their population was actually on the decrease.

It is possible that there was a slight population fall when the emigration to America was most intense - the population of Ireland fell from like causes - but anything of the character suggested by Price seems very unlikely and Eden's criticism justified, if indeed based upon the same sort of political arithmetic as Price's own work. Price was using his statistics to preach a sermon on the disastrous position of affairs, our population falling, our credit gone, our debt insupportable and England without a single friend. He writes thus:

Involved in a most expensive and hazardous contest with two of the first powers in Europe - surrounding nations hostile to us in a degree which leaves us not a friend, or even a well-wisher among them - a considerable part of our strength torn from us, and converted against us - our resources mortgaged beyond the hope or possibility of redemption - a debasing and wasteful luxury destroying public virtue, and producing a dissipation and venality in

private life, and an extravagance in the expenditure of public money, which were never equalled - and, at the same time, a monstrous debt pressing us, and increasing rapidly, without any other support than a frail credit, which the first disaster or panic may break. (pp. 73-5)

When a man writes in this way of the situation of his own country, in the middle of a strenuous war, is it to be wondered at, if he stirs up much popular feeling against himself? We had recent experience ourselves in the case of the pacifists; nay in another Petty, Marquis of Lansdowne, who spoke for peace when the nation was not ready for it. And in this and similar writings of Price we more than suspect he was a mouthpiece of the sentiments of Lord Shelburne, the first Marquis, who made peace in 1783, as his descendant might have done in 1919 had the war gone against us.

The next work of Price which requires our consideration is his work *Observations on Reversionary Payments*. London: T. Cadell, 1771.

The preface tells us that:

A few years ago, many gentlemen of the first eminence in the law, formed themselves into a Society, for providing annuities for the widows of all such persons in judicial offices, barristers, civilians, and solicitors, as should chuse to be members. A plan was agreed upon and printed; but, some doubts happening to arise with respect to it, the directors resolved to ask the opinion and advice of three gentlemen well-known for their skill in calculation. This occasioned a further reference to me; and the issue was, that the plan being found to be insufficient, the whole design was laid aside. (p. vii)

This does not explain why the 'three gentlemen well-known for their skill in calculation' appealed to Price. Possibly it was on account of his *Phil. Trans.* paper.

Price's book on *Reversionary Payments* is perhaps the most remarkable textbook ever issued on actuarial science. Not so much for its novel results as for its strange contents; we never are quite sure whether we are dealing with a scientific work or a treatise on morals. Price never allows us to forget that he is in the first place a theologian and teacher of moral conduct. It is probable that the fact that he united the letters D.D. and F.R.S. on his title page saved him from prosecution. The elaborate phrasing of this page presents a copious but by no means exhaustive bill of contents. It runs:

Observations on Reversionary Payments; on schemes for providing Annuities for Widows and for Persons in Old Age; on the Method of Calculating the Values of Assurance on Lives; and on the National Debt, to which are added Four Essays On different Subjects in the Doctrine of Life-Annuities and Political Arithmetic. Also an Appendix, containing a complete Set of Tables; particularly, Four New Tables, shewing the Probabilities of Life in London, Norwich and Northampton; and the Values of Joint Lives.

The second Edition with a Supplement, containing Additional Observations and Tables. T. Cadell in the Strand, MDCCCLXXII.

Table III of the Appendix is Halley's Mortality Table, Table IV is

one calculated by Price for Northampton, Table V one calculated by Price for Norwich. Table VIII is Simpson's Table for London, deduced from the Bills of Mortality in London for 10 years, 1726-1737, Table XII is a mortality table for London on the bills for 1759-1768, Table XIV a table which Price calls the 'true' probabilities of life in London for all ages (1759-1768), but which is really only his endeavour to correct the previous table by supposing the excess of deaths over births to be due to 'settlers' over 20 years old coming into London. Actually, while the years in which settlers began to come in can be observed, it is impossible to be more than hypothetical as to the manner in which they distributed themselves in age groups. It is also a dogma to assert that the excess of deaths over births is due entirely to 'settlers'; it all depends on how far the records of either births or deaths are to be treated as complete. It is pretty obvious that they were in both cases very defective and we do not know how far these defects counterbalanced. We cannot speak of Price's table as giving the 'true' probabilities; all we can assert is that he has made corrections more or less reasonable and that his table is probably more reasonable than that of Simpson, who kills off half his population by three years of age, while Price only kills off half by 19.

Age at which half those born are dead

Vienna (Sussmilch)	1.5	Brandenburg Rural (Sussmilch)	25
Berlin	2.5	Shrewsbury (Price)	27
London (Simpson)*	3	Breslau (Halley)	34
Norwich (Price)	5	Canton Vaud (Muret)	41
Northampton (Price)	9	Modern England { Males	47
London (Price)*	19	Modern England { Females	52

*[Compare Simpson, 1728-1737 and Price, 1759-1768. E.S.P.]

Price reads stern moral lessons from these figures on the evil of great towns, but I believe that the differences are largely due to the incompleteness of the birth and death records in the large towns, and to the very hypothetical methods of correcting them. Price's Chapter I commences with showing how to calculate rever-sionary annuities and assurances on lives. He shows that the Northampton and Norwich tables confirm De Moivre's hypothesis that decrements of life are equal and Price himself adopts that method for single lives. Coming to joint lives he rejects De Moivre's further hypothesis for calculating them, criticises him rather severely, and works by De Moivre's first hypothesis of equal decrements. There is no doubt that De Moivre understood fully the process of calculating the value of two lives. He actually gives it, a fact which Price seems to have forgotten or overlooked. But in order to get an easily calculable result, he invented a 'fictitious life' and makes - I quote from my lecture notes on De Moivre - 'the somewhat startling assumption that the joint value of the two fictitious lives which have the same values as the real lives, will be the joint value of the real lives.' His justification of this is not very convincing. He writes: 'The combination of two or more real lives will be very near the same as the combination of so many corresponding fictitious lives, and therefore an annuity granted upon one or more real lives is nearly the same value as an annuity upon a fictitious life.'

I drew your attention to this point, long before I had read Price and pointed out to you that De Moivre for ease of calculation was replacing the series (a) by that for fictitious lives, (b):

Survival for:				
1	2	3	...	s yrs
(a) $\frac{n-1}{n-2}$	$\frac{n}{n-2}$	$\frac{n}{n-3}$	$\frac{n}{n-s}$	$\frac{n}{n-s}$
(b) $\frac{p}{2}$	$\frac{p}{3}$	$\frac{p}{s}$		

i.e. an arithmetical by a geometrical series, and that this could only be justified by actual calculations comparing the two results. Simpson attacked De Moivre on this point and indicated that the resulting formulae while sometimes giving good results would occasionally give bad.

De Moivre had again given more correct approximate values in his *Doctrine of Chances*, 1750, but Price says this book gets into few hands and even these formulae may go wrong. Euler in 1760 had given like De Moivre the full values, but also had indicated the labour involved in computations from them. Price writes in 1771 as if he were the discoverer of the real formulae, and had not merely emphasised Simpson's indication that De Moivre's method of approximating to the cumbersome formulae he had himself given, could lead to bad results. That Price's recent biographer should state that Price's concentration on this point led to his hair growing white, seems to me either evidence that Price was not a facile mathematician or that his biographer had not fully realised what Price was about, i.e. showing that De Moivre's approximation was not good enough - a point already reached by Simpson. Price in his own treatment adopts De Moivre's first hypothesis and sums a discrete series by replacing $S(u)^n$ by an integration, without a word of reference to the Euler-Maclaurin theorem. I do not think that Price's contribution to the mathematics of Vital Statistics is a large one.

Where from, therefore, does the importance of Price's *Reversionary Payments* arise? - I think undoubtedly from its second chapter. In this chapter he took one by one the schemes proposed by the various insurance societies of his day and showed that one and all must lead to ultimate bankruptcy. He starts with the London Annuity Society, then takes the Laudable Society, the London Clergy and the Ministers' Widows in Scotland, and shows that they are based on no sound foundation. He points out that all such societies do not for many years reach their maximum out-payments, namely as more and more lives terminate, and that the first entrants will profit at the expense of those dying later, and that ultimately the annual receipts will not cover the annual outpayments. The result of Price's attack was that many of these 'bubble' companies collapsed - some, perhaps, many years before their time - , others re-formed their ways, raising their premiums or reducing their benefits. Notably the Society of Equitable Assurances on Lives and Survivorships consulted Price himself, and to it he continually gave his aid without payment. The Equitable Society presented Dr Price in acknowledgment of his services with a telescope, a microscope and an electrical machine, and these were the delight of the Rogers' children. But Price gave more than his advice to the Equitable. He said to his nephew William

Morgan who was staying with him at Newington Green - 'Billy, do you know anything of Mathematics?' 'No, Uncle,' was Billy's reply, 'but I can learn.' 'Through Price's influence Billy was made assistant actuary to the Equitable in 1774 and actuary a year later. It was a beneficent act of nepotism. Billy became famous as 'Actuary Morgan', the man who made the great reputation of the Equitable, which he served for 50 years. He made a great textbook of Price's *Reversionary Payments*, became an F.R.S. and the great authority in his life-time on actuarial science. Price was the first to insist that the safety of a great insurance society essentially depends on its affairs being under the inspection of able mathematicians (p. 131).

Into the middle of his treatise on reversions Price now inserts a chapter entitled: 'Of Public Credit and the National Debt'. Here he repeats his arguments in favour of a sinking fund, but he also suggests that the nation must always lose if it tries to raise money by life annuities. He compares such a system with his sinking fund, much to the disadvantage of the former. He says 'By raising money on life annuities the present members of a state take a heavier load on themselves in order to exempt posterity, and there would be a laudable generosity in this, were it not for the folly of it; the same exemption being equally practicable at half the expense' (p. 154).

As I have said earlier Price seems to think that money is a thing which left alone increases geometrically, and disregards what the taxpayers must lose before the fund is extinguished. After this chapter follows Essay I. It is a reprint of the *Phil. Trans.* paper on the population of London.

Essay II is a more detailed criticism of De Moivre's rules for calculating the values of joint lives. The next section is entitled 'Observations on the proper Method of constructing Tables for determining the Rate of Human Mortality, the Number of Inhabitants, and the Values of Lives in any Town or District, from Bills of Mortality in which are given, the Numbers dying annually at All Ages' (pp. 235-76). Here the difficulty is that the number of deaths is not equal to the number of births. He practically attributes the number of the excess to 'settlers', and adds that it is possible to ascertain, from the inspection of the deaths at each age, when the settlers begin to come in, and fixes this for London at 20 years. He therefore considers that up to 20 the table is correct, but that owing to the settlers it will not be so later. He supposes settlers to come in from 20 to 30 and perhaps a few later. But he again supposes the tables will be correct after that date. His method of correction is given on p. 247, and runs as follows:

Suppose the annual deaths in a town which has not increased or decreased to have been for many years in the proportion of 4 to 3 to the annual births. It will follow that $\frac{1}{4}$ of the persons who die in such a town are settlers or emigrants from other places and not natives: and the sudden increase in the deaths after 20, will also shew, agreeably to what was before observed, that they enter after this age. In forming therefore a Table for such a town, a quarter of all that die at all ages throughout the whole extent of life must be deducted from the sum of all that die after every given age before twenty; and the remainder will be the true number living at that given age. And if at 20 and every age above it

this deduction is omitted or the number of the living at every such age is taken the same with the sum of all that die after it, the result will be (supposing most of the settlers come in before 30 and all before 40) a Table exact till 20, too high between 20 and 30; but nearly right for some years before 40 and after 40 exact again. Such a Table it is evident, will be the same with the Table last described at all ages above 20; and different from it only under 20. It is evident also that on account of its giving the probabilities of life too great for some years after 20, the number of inhabitants deduced from it may be depended on as somewhat greater than the truth; and more or less so, as the annual recruits enter in general later or sooner after 20. We can now see how Price formed his Table for London. He first wrote down all the deaths at each age for the 10 years 1759-1768 as in column (3) of the following table.

Thus we get the right table if births = deaths. But the deaths were 22,956 and the births 15,710; the excess is 7246 or near a third of the burials. Price observes that the increase of deaths begins or he thinks it does at age 20. He therefore might suppose a third of all the deaths to be those of settlers after 20. He does not however take 1/3 but 1/4, he justifies this number only by saying that it will allow for more omissions in the births than the burials, and he says that this will enable him 'to be more sure of obtaining results that shall not exceed the truth'.

It will be noted that he has already reduced the total of deaths to 1000 so as to give 1000 births. He now proceeds to construct another table, in which he leaves the whole beyond 20 to stand precisely as in the first table and therefore he does not in any way correct for the settlers being spread over several years. But he thinks they would in bulk have all arrived by 30 and that certainly his table would be valid by 40, and not unduly divergent from 30 to 40.

Price now proceeds as follows: he tells us to subtract one quarter of the total number of births, i.e. 250, for these are the excess of deaths over births, from each number living up to 20; this gives col. (4). Then we are to adjust these last figures so as to get 494 instead of [244] at age 20; the multiplier is 0.024. Using this we find the in-set column A, which does not quite agree with B, Price's series. I presume that after the first six entries he was not satisfied with the differences or else he worked on the whole numbers before reducing them to 1000 births, although I am by no means sure that this would lead to his results. I am inclined to think he smoothed the differences but how he did that smoothing is not clear. He does not tell us what he has done, and the position is confused by a reference to the number of boys dying in Christ's Hospital, which for 30 years past gave, between ages of eight and 16, one death in 70.4 *per annum*. He thinks the boys in that hospital would be better off than the boys in London generally. I should not have referred to this point, as Price certainly does not say he modified his deaths between eight and 16 by this hypothesis, had not his nephew William Morgan, when issuing a seventh edition of Price's book in 1812 (Vol. II, p. 306-7), spoken about adjusting the deaths between eight and 16 to one person dying in 86, 'which is,' he writes, 'a smaller proportion than Mr Wales says have for 20 years died of children of the same ages in Christ's Hospital.' I do not know that Price

Age	No. Alive	Deaths	(1)
1	760	661	2
2	619	619	3
3	590	590	4
4	569	558	5
5	541	535	6
6	526	522	7
7	518	515	8
8	512	509	9
9	506	503	10
10	499	494	11
11	487	479	12
12	471	463	13
13	455	447	14
14	439	431	15
15	422	413	16
16	404	395	17
17	386	377	18
18	368	359	19
19	350	341	20
20	332	322	21
21	312	302	22
22	292	282	23
23	272	262	24
24	252	242	25
25	233	224	26
26	215	206	27
27	198	190	28
28	183	176	29
29	169	162	30
30	155	147	31
31	139	132	32
32	125	118	33
33	111	104	34
34	97	90	35
35	83	76	36
36	70	71	37
37	64	64	38
38	58	58	39
39	53	53	40
40	48	48	41
41	43	43	42
42	38	38	43
43	33	33	44
44	28	28	45
45	23	23	46
46	18	18	47
47	13	13	48
48	8	8	49
49	3	3	50
50	0	0	51
51	1518	1518	52
52	1032	1032	53
53	832	832	54
54	747	747	55
55	688	688	56
56	646	646	57
57	619	619	58
58	599	599	59
59	585	585	60
60	575	575	61
61	567	567	62
62	559	559	63
63	551	551	64
64	544	544	65
65	538	538	66
66	532	532	67
67	526	526	68
68	520	520	69
69	515	515	70
70	512	512	71
71	504	504	72
72	501	501	73
73	508	508	74
74	515	515	75
75	522	522	76
76	541	541	77
77	558	558	78
78	577	577	79
79	589	589	80
80	599	599	81
81	603	603	82
82	623	623	83
83	646	646	84
84	688	688	85
85	747	747	86
86	832	832	87
87	959	959	88
88	1032	1032	89
89	1188	1188	90
90	1332	1332	91
91	1488	1488	92
92	1632	1632	93
93	1776	1776	94
94	1920	1920	95
95	2064	2064	96
96	2208	2208	97
97	2352	2352	98
98	2496	2496	99
99	2640	2640	100

adjusted like Morgan, but both are - just like Simpson - exceedingly obscure as to how they reached the final form of their tables. And this applies not only to the London Table, but to those like the Northampton and Norwich Tables where the deaths and births are not equal. Another point more definitely to Price's credit is that he insists upon the greater longevity of women, illustrating it from various sources, and thus leading to the desirability of separate mortality tables for men and women.

In these matters he refers to the works of Kersseboom and Süssmilch, thus indicating not only that he had read them, but probably that he owed many of his ideas to them. He also emphasises that the mortality tables will vary not only with environment but with time and that while we may consider the decrements of life constant for five years, it is absolutely needful continually to take stock of our mortality returns and have tables prepared for many places and times. Whether real reliance can be placed on the London table constructed by Price I doubt, but largely on the basis of it he infers not only that large towns are unhealthy, but that the reason of their unhealthiness is their immorality. Here he launches into the rhetoric of the preacher and we find much weird reading in the course of a scientific treatise; he writes:

I have represented particularly the great difference between the probabilities of human life in towns and in country parishes; and from the facts I have recited, it appears, that the further we go from the artificial and irregular modes of living in great towns, the fewer of mankind die in the first stages of life and the more in its last stages. The lower animals (except such as have been taken under human management) seem in general to enjoy the full period of existence allotted them, and to die chiefly of old age: *and were any observations to be made among savages, perhaps the same would be found true of them. DEATH is an evil to which the order of providence has subjected every inhabitant of this earth; but to man it has been rendered unspeakably more an evil than it was designed to be. The greatest part of that black catalogue of diseases which ravage human life is the offspring of the tender-ness, the luxury, and the corruptions introduced by the vices and false refinements of civil society. That delicacy which is injured by every breath of air, and that rottenness of constitution which is the effect of intemperance and debauchery, were never intended by the author of nature; and it is impossible, that they should not lay the foundation of numberless sufferings, and terminate in premature and miserable deaths. Let us then value more

*Price cites calves as animals that have a high mortality because man treats them artificially. He seems never to have heard of beasts and birds of prey, nor reckoned how many gnats a swallow consumes in its eventide flights without regard to their youth or senility. On the whole it seems exceedingly improbable that many wild animals survive the risks of their environment up to the limit of old age. And of savage man the same is probably true. We know that the average age of death in civilized man is increasing.

†[The italics here are K.P.'s E.S.P.]

the simplicity and innocence of a life agreeable to nature; and learn to consider nothing as savageness but malevolence, ignorance and wickedness. The order of nature is wise and kind [*Price* was hardly an observer! K.P.]. In a conformity to it consists health and long life; grace, honour, virtue and joy. But nature turned out of its way will always perish. *The wicked shall not live half their days.* Criminal excesses embitter and cut short our present existence, and the highest authority has taught us to expect, that they will not only kill the body, but the soul; and deprive it of an EVERLASTING EXISTENCE. [*Here Price's italics fail him and he resorts to capitals. K.P.*] (p.276)

Nor is the mortality table alone the text for a sermon, even the sinking fund is an incentive. After endeavouring to prove by over-looking the taxpayer that a sinking fund will be just as efficient if we borrow money at 3% or 6%, *Price* continues

One particular advantage attending it (the sinking fund) already hinted, I will beg leave here to repeat. By keeping the stocks steadily at or near *par*, that fluctuation in them would be in a great measure prevented, which now produces so many evils; and which, with the aid of annual lotteries, will I fear, in time, ruin all honest industry, and turn us into a nation of sharps and gamblers. (p.341)

The proposal to 'return to nature' *Price* of course limbed from Rousseau, and his hatred of great towns as demoralising a nation might have been easily acquired from *Süssmilch*, if he had not been a country-man who was himself a 'settler' in London. In a Supplement to the second edition *Price* has collected further material to demonstrate his points, he has met with *Muret's* data for the Canton Vaud, *Margentin's* for Sweden and *Süssmilch's* for Vienna and Berlin, besides *Gorsuch's* data for Shrewsbury and *Süssmilch's* for a country Parish in Brandenburg. We are provided with further life-tables without any exact account of how they have been prepared, and from them *Price* draws up a further indictment of the great cities. Even where the old live longer in great towns than in the country *Price* asserts it is merely the effect of selection, it is only the most robust who have been long seasoned to town life who survive in London, while

persons of feeble frames may with the help of the simple manners and pure air of the country attain to old age; but in great towns they stand no chance of this: the effect of which must be, that at the same time that greater numbers survive to old age in the country, they will die off faster. (p.349)

We may take out some values from *Price's* indictment:

	Number dying annually	Ages to which $\frac{1}{2}$ born live	Number who reach 80 yrs	Probability of living 1 yr:	at birth	at 25	Expectation of life:	at birth	at 25
Pais de Vaud	1 in 45	41	1 in $21\frac{1}{2}$	$4\frac{1}{2}$ to 1	$3\frac{1}{2}$ to 1	117 to 1	37 yrs	$34\frac{1}{2}$ yrs	at 25
Brandenburg	1 in 45	$25\frac{1}{2}$	1 in $22\frac{1}{2}$	$4\frac{1}{2}$ to 1	$3\frac{1}{2}$ to 1	110 to 1	$32\frac{1}{2}$ yrs	$35\frac{1}{2}$ yrs	at 25
Holy Cross	1 in 33	27	1 in 11	$4\frac{1}{2}$ to 1	$4\frac{1}{2}$ to 1	100 to 1	$33\frac{1}{4}$ yrs	35 yrs	at 25
Berlin	1 in $26\frac{1}{2}$	$2\frac{4}{3}$	1 in 37	$1\frac{1}{4}$ to 1	$1\frac{1}{4}$ to 1	50 to 1	18 yrs	$27\frac{3}{4}$ yrs	at 25
London	1 in $20\frac{3}{4}$	$2\frac{4}{3}$	1 in 40	2 to 1	2 to 1	56 to 1	18 yrs	26 yrs	at 25
Vienna	1 in $19\frac{1}{2}$	2	1 in 41	$1\frac{1}{5}$ to 1	$1\frac{1}{5}$ to 1	66 to 1	$16\frac{1}{2}$ yrs	$28\frac{1}{3}$ yrs	at 25

From this table Price draws the conclusion that the baleful influence of great towns is plain. It arises from:

First the irregular modes of life, the luxuries, debaucheries, and pernicious customs, which prevail more in towns than in the country. Secondly the foulness of the air in towns, occasioned by uncleanliness, smog, the perspiration and breath of the inhabitants, and putrid steams from drains and kennels and common sewers. It is in particular, well-known that air spoiled by breathing, is rendered so noxious as to kill instantaneously any animal that is put into it. There must be causes in nature, continually operating, which restore the air after being thus spoiled. But in towns it is, probably, consumed faster than it can be adequately restored; and the larger the town is, or the more the inhabitants are crowded together, the more this inconvenience must take place. (p.355)

This passage is not only suggestive of Price's views, but also read in the light of history most suggestive. Priestley discovered oxygen in 1774, the year Price was writing. Carbonic Acid Gas was discovered by Van Helmont at the beginning of the 17th century, but it was not till Lavoisier's work in 1781, seven years after Price's book, that its relation to oxygen and carbon was made clear, and its decomposition by the green leaves of plants really understood. I have already noted that Price following Muret and Süssmilch had recognised that women live longer than men. This point was also made by Deparcieux and Wargentin on the basis of French and Swedish data. But the latter also, with Muret, drew attention to the fact that married

women live longer than single women. Muret had supposed that the women who marry are a selected body and are the more healthy and vigorous section of the sex. Price finds this by no means the only reason, for he holds that 'it may, I think, be expected, that in this as in all other instances, the consequences of following nature must be favourable' (p. 357). A table had been printed and issued by the 'Society for Equitable Assurances on Lives and Survivorships' which supposed female lives to be more hazardous than male lives, but at Price's suggestion this was withdrawn, he being at the same time desired to inform the public of this fact 'the Society being determined to maintain the just credit it has acquired, by keeping strictly in every instance to calculations, founded on the best observations' (ftn., p. 357). Unfortunately Price provides no separate mortality table for women, but trusts to deaths of widows and widowers and the relative frequency of the sexes in various populations chiefly drawn from Süssmilch. With Muret Price was in close sympathy, for the Swiss had insisted that luxury and the enlargement of farms obstructed the growth of population even in the Canton Vaud. Such obstruction Price says exists in far greater intensity in England.

In consequence of the easy communication lately created, between the different parts of the kingdom, the London fashions and manners, and pleasures, have been propagated everywhere; and almost every distant town and village now vies with the capital in all kinds of expensive dissipation and amusement. This enervates and debilitates, destroys virtuous industry, and brings on poverty, dependence and venality. (p. 360)

Can you imagine all the dissipations of London, that sink of iniquity, being conveyed by that 'easy communication lately created', i.e. the stage-coach, to all the villages of the country? What would he have said of railways and motor cars? For Price London was the source of the depopulation of the kingdom, which he estimates, using Davenant's figures ('the best of all political writers', p. 361) at a million and a half since 1690.

What renders this calamity more alarming is, that the inhabitants of the cottages thrown down in the country, fly to London and other towns, there to be corrupted and perish... (p. 363)

In London, those who used to satisfy themselves with one house or perhaps half a house, must now have two houses. Those who used to live plain must now live high; and those that used to walk, must now be carried. This is the reason of the increase of consumption and of buildings in London, and not an increase of the inhabitants, for the number of inhabitants is certainly less now that it was forty years ago. (ftn., p. 364)

What remedies has Price for these troubles?

Enter immediately into a decisive enquiry into the state of population in the kingdom. - Promote agriculture. - Drive back the inhabitants of the towns into the country. - Establish some regulations for preserving the lives of infants. - Discourage luxury, and celibacy, and the ingrossing of farms. - Let there be entire liberty; and maintain public peace by a government founded not in constraint, but in the respect and the hearts of the people... But above all things, if it be not now too late, find out means of

avoiding the miseries of an impending bankruptcy, and of easing the nation of that burden of debts and taxes under which it is sinking ... [But] I am crying in vain. Corruptions and follies of the worst sort have, I am afraid, taken too deep root among us. (pp. 364-5)

It is I think fairly clear that some leaves of Price's last Sunday sermon had here got mixed with the manuscript of his treatise on reversions; But I must not leave Price's great book - for with all its faults it was a great book - without pointing out a most important suggestion made in a second supplement on the schemes for providing annuities for Widows and for Persons in Old Age. This is no less than a first proposal for Old Age Pensions to replace the poor law. On account of this Price has been not unjustly called the 'Father of Old Age Pensions'.

Price's scheme seems remarkably good, especially because it associates the pension with local funds and local management, so that supervision may be more real than in a national scheme. His plan for establishing 'Parish Annuities' was proposed in the *Public Advertiser* for July 22, 1772, and is repeated in the second edition of his treatises, pp. 380-7. He begins by pointing out that the money raised annually for the poor amounts to at least a million a year. He notes that the poor

do not provide for their old age like members of the other classes, and attributes this to the fact that opportunities are not brought home to them and no encouragement given to them to provide for old age. He points out that a man who has saved £10 finds no inducement to put it into the 3% Bank annuities, which give him only 7s. a year. Also if he lend it to neighbours, those neighbours may themselves go bankrupt and the savings be lost. Price speaks as if this were a common experience. He therefore suggests that the Churchwardens and overseers of every parish should be empowered by Act of Parliament to grant life-annuities to the inhabitants of the parish, to be paid out of the poor rates of the parish, and all lands and other property that are chargeable to the poor rate should be answerable for the payment of these annuities. 'This circumstance would give these annuities great credit with the poor inhabitants, by setting before them a solid and ample security for the payment.'

He suggests 3% interest or a higher rate if the churchwardens and overseers of the poor think fit. But at 3% they should have a right to an annuity and be able to compel the overseers to grant it. No annuity over £20 per annum should be granted on a single life, nor any less sum than £5 as unit be allowed to be applied. There should be registration in proper books in each parish and a copy given to the person concerned; copy or book to be evidence of contract. The money should be invested in 3% bank annuities and be the legal property of churchwardens and overseers as trustees for the grantees; the interest on these sums should be annually invested in the purchase of more principal continually, so that a perpetual fund for the payment of annuities should be created. Any deficiencies, if they should ever happen, to be made good out of the poor rates and poor funds of the parish. No annuity he thinks should begin before the age of 55 or 60 and he would prefer the annuity to be £5 for five years, £10 for the next five years and after that £15 for the remainder of life, and further that it should be paid quarterly, and the purchaser might be allowed to purchase $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, 1, $1\frac{1}{3}$, $1\frac{1}{2}$, or 2 annuities as he would find convenient.

Price gives a table based on the mortality table of Northampton for the purchasing price of £5 (five years), £10 (five to 10 years) and £15 afterwards to begin (1) at 60, (11) at 55 for men of every age from 15 to 40. Thus a man of 21 could purchase such an annuity for age 60 at £11.19s.0d. or for age 55 at £20.3s.6d. in one payment (p.387). The whole plan seems for the time a good one. Price adds:

In this way persons who are now young might make an ample provision for old age on easy and inviting terms. - A plan of this kind, established by the legislature, for the benefit of the infirm and aged poor, would instead of lessening industry among them, promote it; and at the same time it would ease parishes of a considerable part of their present burdens. (p.386)

In 1773 Francis Masères, Curator Baron of the Exchequer, took up Price's scheme and a bill with suitable tables was prepared by Mr Dowdeswell and carried through the House of Commons. This shows that Price's proposal was a feasible scheme. It was, however, rejected by the House of Lords. In 1786 the Rev. John Acland revived the project and published with Price's assistance a pamphlet entitled: *A Plan for rendering the Poor Independent of Public Contributions*. In 1789 the matter came again before the House of Commons, sickness being added to Old Age. Price was asked by the Committee of the House to compute the requisite tables. This he did and a bill was passed by the House of the Commons again, only to be once more rejected by the House of Lords. England was thus first in the field with the proposal for state pensions and allowances for sickness and old age in the case of the poor, or rather Price was. The House of Lords delayed their adoption for at least 125 years, and then they only came in England owing to Bismarck's adoption of them in Germany in his great scheme to out-socialise the socialists. It is doubtful whether our gratitude to Price should be more valuable than our execration of the Lords. Anyhow Price stands distinctly there as the Father - if an impotent father - of Old Age Pensions, now universal in civilised countries. There ought to be a statue of him in all great industrial quarters with that inscription.

A number of papers by Price in the *Philosophical Transactions* now demand our attention. We first note one in Vol. LX, 1770 (issued 1771). The transit of Venus was then exciting astronomical and even wider circles. On September 6, 1769, John Winthrop, Hollisian Professor of Mathematics and Natural Philosophy in Cambridge, New England, wrote a letter to Benjamin Franklin on the effect of aberration of light on the apparent time of transit. Franklin presented this to the Royal Society on February 8, 1770. This produced a letter from Price to Benjamin Franklin read on December 20, 1770, entitled: 'A Letter from Richard Price, D.D., F.R.S., to Benjamin Franklin LL.D., F.R.S., on the Effect of the Aberration of Light on the Time of a Transit of Venus over the Sun.' Price points out that Winthrop had only allowed for the effect of aberration of light on Venus while there is also the effect on the sun. He then says that the tables for the position of the sun are supposed to allow for aberration in its position, but he then holds that if the apparent position of the sun be given and not its real position there will be a greater difference between the calculated and observed times than if the real position of the sun had been used for the tables. I do not propose to investigate the accuracy of Price's 19 minutes' retardation on true beginning of contact. I cite the paper only to

indicate the wide nature of Price's interests.

There is an earlier paper by Price in this volume of the *Phil. Trans.*, pp. 268-76, entitled: 'Observations on the proper Method of calculating the values of Reversions depending on Survivorships', (May 10, 1770). This is practically embodied in the *Treatise on Reversions* and criticises the methods of dealing with the topic both of De Moivre and Simpson. Price gives a strict demonstration, for equality of complements, in the case of a reversion depending upon a surviving B. Price's next paper appears in Vol. LXIV, Part I, of the *Phil. Trans.*, 1774, pp. 96-8. Priestley communicated a paper to the Society printed just before that of Price in which he combated the views of a certain Dr Alexander of Edinburgh who had asserted there was not any danger to be apprehended from living near putrid marshes. Priestley collected 'air' from stagnant or putrid water and found a light would not burn in it, and concluded that the air is poisoned by the presence of putrid marshes.

Price's paper is entitled: 'Further Proofs of the Insalubrity of marshy Situations.' After referring to Priestley's paper, he cites the data collected by Muret for the Canton Vaud. Among these were particulars of a marshy parish containing 169 families or 696 inhabitants. Muret had given tables for the rates of mortality for 15 years. There were also tables for the mountainous parts.

Mountains Marshes

One half live to	47	25
There live to 80	1 in 20	1 in 52
Man of 40: chance	80 to 1	30 to 1
of living a year		
Expectation of life:		
at 20	41 yrs	30 yrs
at 30	33 yrs	23 yrs
at 40	25 yrs	15 yrs

Price asserts that these differences in mortality are due to the air of the hills being better than the air of the low country. But he does not investigate whether the economic conditions or the occupations were different in the two districts, nor whether there was a racial difference between the people of the low and high lands, i.e. Alpine and Mediterranean races.

His next paper is entitled: 'Observations on the Difference between the Duration of Human Life in Towns and in Country Parishes and Villages.' It is printed as 'Redde', June 22, 1775, and appears in Part II of *Phil. Trans.*, Vol. LXV of that year, pp. 424-5. This contains the usual kind of evidence against which the usual criticisms can be raised. Thus Price gives the evidence from Manchester by Dr Percival, where one in 28 die annually in a town and one in 56 in the adjacent country. Price finds the chief objection to the result to be that the country area was based on one year's deaths, but the number of inhabitants of the country part of Manchester parish was 13,786 and number of deaths 246. I find the chief objection in the fact that there is no

*For Percival's paper, see pp. 322-5 of the same volume.

evidence of any equality of age distribution or of sex, and that allowance is made for dissenters' deaths by roughly adding on 50 dissenters' burials to every 900 to 1000 churchmen. There is no evidence provided that the dissenters were only 1/20 of the Anglicans.

Price next proceeds with his usual data. He quotes for the difference between town and country, Wargentin for Stockholm (1 in 19), Heberden for Madeira (1 in 50), Muret for Vaud (1 in 45), Parish of Ackworth in Yorkshire (1 in 47, 1767, and 1 in 56, 1757). He puts it all down in the first place to the luxury and irregular modes of life in towns, and in the second to the foulness of the air. He does consider the effect of immigration, and argues that those in the best period of life, 15 to 30, go to the towns, and consequently the feeble, i.e. the young and the old, are left in the country while the more robust go to the towns; consequently the death-rate in the towns ought to be much less than that in the country, whereas it is much greater. He points out that in Manchester town the inhabitants under 15 and over 50 do not make up half the total, but in the country they make considerably more than half. Actually we have

$$\frac{13467}{27246} = 0.494, \quad \text{Country} \frac{13786}{7305} = 0.530.$$

I do not think the difference between these numbers would point to much loss from country to town. But I have worked out the corresponding numbers, keeping the sexes apart, from Wargentin's data. They are:

All Sweden without Stockholm Stockholm only

% < 15 or > 50	male 51.5	female 51.3
years of age:	38.0	39.0

According to this the old and the young of both sexes are far more numerous in the country than in town, but in the country there died 1 in 35, in the town 1 in 19. It does seem therefore that as far as the Swedish statistics go the death-rate does not depend on a difference of age-constitution. Price also observes that although the number of the population between 15 and 50 is emphasised in the towns, and so they are 'more filled than the country with inhabitants in the most vigorous periods of life; yet one child less in four is born in the town than in the country' (p. 434). He attributes this to the smaller number of persons marrying and the postponement of marriage in towns. On p. 435 of this *Phil. Trans.* paper he gives a fairly long table based upon Süssmilch and Short of over four million births, and adding up finds the sex ratio 1.052, i.e. 20 males to 19 females. For over 900,000 Swedish births the ratio is 1.050, which Price gives as 20 to 19 and says this is more accurate than Derham's 1.077 or 14 to 13. Price points out that the ratio is even greater in the stillborn: actually for nine years in all Sweden, without Stockholm, it was 11,034 to 8,145 or 1.355 and for Stockholm for nine years 390 to 276 or 1.413, the latter being too few for a reliable* statement as to whether the stillborn ratio is really greater for towns than country.

*% males in all Sweden, less Stockholm: 57.5 ± 0.357
% males in Stockholm: 58.6 ± 1.909

He considers that males are more short-lived than females owing (i) to the peculiar hazards to which they are subject, (ii) to their more irregular modes of life, but also he considers that owing to some peculiar delicacy in the male constitution they are rendered less durable; else-where he speaks of males as having more 'brittle' lives, rather an apt term.

In the Appendix, besides tables taken from Wargentin and Süssmilch, Price gives two tables from the Parish of Ackworth in Yorkshire for two sets of 10 years, 1747-1757 and 1757-1767. These are new material and similar tables would be very valuable now-a-days if village parsons would form them. They not only give the ages at death but the diseases of which individuals died and the age distribution of the living population, its numbers and sex. In returns where there are only 339 births and 263 deaths in 20 years, it is difficult to draw any safe conclusions, but the chief causes of death are Infancy 9.9%, Senility 20.5%, 'Fevers' 22.1% and 'Consumption' 23.2%. Of cancer there were only two cases, i.e. about 0.8%, while small pox accounted for 5.3%. There is a rather interesting series of small censuses taken every year in Rome from 1762 to 1771 (p. 445), which classify the people chiefly from the clerical standpoint. Price does not state whence he abstracted it.

In *Phil. Trans.* Vol. LXVI, Part I, 1776, pp. 109-28, is a paper entitled: 'Short and Easy Theorems for finding in all cases, the Differences between the Values of Annuities payable Yearly, and of the same Annuities payable Half-yearly, quarterly or Monthly.' It is in the form of a letter to Sir John Pringle. The mathematics involved are no more than the summing of such series as $x + x^2 + \dots + x^n$ and

$x + 2x^2 + 3x^3 + \dots + nx^n$. If the payment be at $1/m$ of a year and if r be the rate per £1 per year, so that r/m is the interest per $1/m$ year, then we have to sum

$$\frac{1}{m} + \frac{1}{m} \left(1 + \frac{r}{m}\right) + \frac{1}{m} \left(1 + \frac{r}{m}\right)^2 + \dots + \frac{1}{m} \left(1 + \frac{r}{m}\right)^{nm}$$

$$= \frac{1}{m} \frac{1 + \frac{r}{m}}{1 - 1/(1 + \frac{r}{m})} - \frac{1}{m} \frac{1 + \frac{r}{m}}{1 - 1/(1 + \frac{r}{m})} \left(1 + \frac{r}{m}\right)^{nm}$$

If m be made indefinitely large we have for 'momentary' payment

$$\frac{1}{1 - e^{-rx}}$$

Price shows that if $n = 100$ yrs, the values for yearly to momentary payment only range from 24.505 to 24.542.

He then discusses the question of whether the interest for $1/m$ yearly payments ought to be r/m where r is the yearly interest. This seems to depend on whether the Insurance Company gets its money in $1/m$ year payments or yearly payments. * He also discusses the value of

*Price dismissed De Moivre's view that r should be less than the yearly r , because the annuitant could put out his money at interest, with the remark 'It is obvious that this cannot be the proper method of computing these values' (p. 113).

annuities for a fixed number of years and for a life. In *Phil. Trans.* Vol. LXXV, Part II, 1785, p. 349, is a paper by the Rev. Mr Morgan, George Cadogan Morgan, a nephew of Price, by whom it was communicated. It starts by supposing light to be a body and therefore subject to attraction, and that light as a body before the combustion of a substance was part of that substance. Further, light is a heterogeneous body and attractive power operates with different degrees of force on its components. Price in a postscript gives a rather doubtful approval to such theses.

The last paper we have to deal with is one presented to the Royal Society by Price in 1786. It is printed in Vol. LXXVI, pp. 349-64 and entitled 'Observations on some causes of the Excess of Mortality in Males above that of Females'. By Joseph Clarke, M.D., Physician to the Lying-in Hospital at Dublin. In an introductory letter Price says that the facts revealed in Clarke's paper have made him clear as to a circumstance in human mortality, - namely the more 'brittle' lives of males - which he did not previously so well understand.

Clarke's thesis is a very simple one: the male is larger in size than the female hence the male foetus requires not only more nutrition but as all gynaecologists know there is in difficult deliveries more chance of saving a female than a male child. Even if the male is saved, injuries not immediately visible may operate in weakening the male constitution and producing a being more delicate and so more liable to die.

Delicate mothers are more common in towns than in the country, for there rickets, scrofula and bone diseases are more frequent than in the country; these either result in actual malformation of the woman, or in her incapacity to supply a male offspring with requisite nourishment. Clarke suggests without evidence that possibly one woman in five in a town can adequately suckle her baby, while not one in ten fails to do so in the country. He provides a most valuable table of the years 1757-1784 dealing with 20,625 births in the Dublin Lying-in Hospital, with information as to twins, sex, viability etc., and also as to the women dying in child-bed and the number of children dying in the first fortnight. He tells us that near one half more twins die than single children, and near one third more are stillborn, and that this cannot arise from difficulty of birth, because it is well known that twins are more easily born than single children; it arises, he says, from scantier nutrition, and this makes them more delicate at birth and in infancy. On the other hand while double the number of twins die or are stillborn as compared to single children, yet the proportion of male twins to female twins lost is less. Of twins only one fifth more male die than female, while of single children it is one quarter; of male twins only one third more are stillborn than of female twins, while the single stillborn males are double the female. Clarke attributes all this to the male twin suffering less in delivery than the male single child. He says that the majority of males over females is reduced to less than half its value at birth before the babies leave the hospital. In the case of twins so great is the loss - one half being dead and stillborn of the males - that a majority of female twins leave the hospital.

Clarke also proceeded to weigh and measure new-born babes a few hours after birth. It is true he only did 60, but he found both for weight and tape head measurements the male exceeded the female. Of the women who died in childbed, 126 gave birth to males and 88 to females. In the case of twins, while the mortality of the mother was greater than

in the case of single children, that of the twins themselves was less than that of the single children with dead mothers. The sex ratio was very high, 1.123, possibly because the women expecting a harder delivery went to hospital, and tended to be those about to give birth to male babies. He gives the following figures:

1 child in 6.5 dies before 16 days. 1 stillbirth to 20 births.
1 woman has twins in about 60. 1 woman dies in childbed in 87.

Sex ratio for the Stillborn (single)	1.715
Dead (before 16 days?)	1.328
Sex ratio for Twins	1.069
For Stillborn Twins	1.450
"	:
For Dead Twins	1.275

Clarke's data, pp. 363-4, would be of very considerable value and interest to any one dealing with modern data of this type and we have to thank Price for the incentive given to its collection, and for its publication in the *Phil. Trans.*

With this paper our review of Price's contributions to statistical science closes. It must not be supposed that his scientific work went without criticism and attack any more than his political writings. J. Wimpsey in 1772 issued 'The Challenge, or Patriotism put to the test in a letter to Dr Price, occasioned by his late publications on the National Debt'. Charles Brand in 1775 wrote a 'Treatise on Assurances, with several objections against Dr Price's Observations on the Amicable Society'. Samuel Clark in 1777 published 'A Letter to Dr Price ... containing an entire refutation of his treatise on Observations on Reversionary Payments', while J. Laurie had issued in the previous year 'Tables of Simple and Compound Interest ... to which are subjoined a few remarks in which Dr Price's Observations on Reversionary Payments ... are proved to be erroneous'. Even as late as 1816 W. Rouse wrote 'An Investigation of the errors of all writers on Annuities, including those of ... Dr Price'. While five years later, 1821, appeared J. B. Benwell's 'An Essay on Interest and Annuities ... with a critical review of De Moivre's and Dr Price's methods'.

10.7 Price and the independence of the American colonies

But it is time to turn once more to the man as apart from his scientific work, and to note that in 1776, just a year after the outbreak of the American War, Price definitely took up the cudgels for his American friends and published his *Observations on the Nature of Civil Liberty, the Principles of Government, and the Justice and Policy of the War with America*. Within the year it ran through thirteen editions in England and three editions in America, and was reprinted in Edinburgh and Dublin. Price's work was published on February 8, 1776*. *We must remember that the American declaration of Independence was not made till July 4, 1776.

Read what definitions Price gives of the four classes he makes of Liberty:

I. By PHYSICAL LIBERTY I mean that principle of Spontaneity, or Self-determination, which constitutes us Agents; or which gives us a command over our actions, rendering them properly ours, and not effects of the operation of any foreign cause.

The reply of Priestley to this would be that all our actions whether we realise it or not are the effects of the operation of foreign causes. A more moderate view would be that our physical environment, our physiological constitution and the existence of other living agents allow to the ordinary man very little physical freedom.

II. MORAL LIBERTY is the power of following, in all circumstances, our sense of right and wrong; or of acting in conformity to our reflecting and moral principles, without being controlled by any contrary principles.

But what if our sense of right and wrong differs essentially from that of our fellow citizens? It is probable that every thoughtful man is so far in advance of his age as to think right or wrong a number of matters, which the bulk of his contemporaries think wrong or right. But his moral liberty is held in check by the tribal customs. When a man does what passions and so has lost his moral liberty (p.6). He thus sets himself up to judge the standard of right and wrong in another, i.e. he is himself taking the tribal custom as standard. And that will be always the case; the man acts morally if he acts according to the social customs of his time, his race, his nation. Price's definition is based on an absolute code, revealed in some way to the individual, and if it were not, if there were for each man a different code which he was at liberty to follow, the life of the community would be wrecked. Man is compelled as a member of a herd to sacrifice his moral liberty, if by moral liberty Price means what an individual might conceive would be best for the community; all the combined action of individuals can do is to stretch gradually the tribal custom, or to run all the risks which follow a violent rebellion.

III. RELIGIOUS LIBERTY signifies the power of exercising, without molestation, that mode of religion, which we think best; or of making the decisions of our own consciences, respecting religious truth, the rule of our conduct, and not any of the decisions of others.

Here again it is a matter of social utility. The primitive tribe which allowed freedom to dissenters from its tribal faith, would clearly have had no stability, for the powers of the state were the force of religion, or superstitution if you will. Probably the persistence of the Jewish nation largely depended on their worshipping one god in one way, and on destroying or driving out any of their members, who thought it desirable to try what another god could do for them. Even in mediaeval days the national unity in religion was a source of strength; men did not accept religion by thinking, but accepted it as they accepted their nation, as a heritage. The main force, however, against national religions has not been thinking in men, but the fact that the universal religion was controlled by a force outside the State and often in

controversy with the individual state. Probably the modern state might be stronger and more stable had it a common religious belief, but the day is long passed when statesmen thought it possible to enforce a common creed, and religion has thus lost its main value as a factor in the stability of a nation.

We now come to Civil Liberty, but find to our great surprise that Price has changed the form of his definition; it does not depend on the self-determination of the individual, but rather on the self-determination of the State.

IV. CIVIL LIBERTY is the power of a Civil Society or State to govern itself by its own discretion; or by laws of its own making, without being subject to any foreign discretion, or to the impositions of any extraneous will or power.

Slavery, according to Price, is the imposition of any will other than that of the majority of a community, which claims a power of making laws for it and disposing of its property. Note that 'majority of the community', and note that Price does not define the State or Community. Was America part of the British State or not? Would it have been less slavery if the colonies had had representatives according even to their population in the House of Commons, and that House had voted for their taxation? It would certainly have been equally *inexpedient*, but according to Price a majority would justify the abrogation of self-determination and the natural and unalienable rights of man! When, says Price, 'the operation of any cause comes in to restrain the power of Self-government so far Slavery is introduced: Nor do I think a preciser idea than this of liberty and Slavery can be formed', (p.5), it is clear that he is thinking of Great Britain and America as separate states. Other-wise he would have to support the view that a minority had a 'right' - 'natural and unalienable', of course - to rebel against a majority. The wiser statesman will certainly get on better, if he keeps clear of abstract ideas and faces the problem from the standpoint of expediency. On any other ground it is difficult to understand why the majority can dictate and enforce laws governing my actions, but not my particular mode of religion, although one as well as the other supersedes my private judgment.

Once having defined liberty, however obscurely, as the right of self-determination, Price can mount his good steed and canter away:

I cannot help wishing I could here fix my reader's attention, and engage him to consider carefully the dignity of that blessing to which we give the name of LIBERTY, according to the representation now made of it. There is not a word in the whole compass of language which expresses so much of what is important and excellent. It is, in every view of it, a blessing truly sacred and invaluable. - Without 'Physical Liberty' man would be a machine acted upon by mechanical springs, having no principle of motion in himself, or command over events; and therefore incapable of all merit and demerit. Without 'Moral Liberty' he is a wicked and detestable being, subject to the tyranny of base lusts, and the sport of every vile appetite. And without 'Religious' and 'Civil Liberty' he is a poor and abject animal, without rights, without property, and without a conscience, bending his neck to the yoke, and crouching to the will of every silly creature who has the insolence to

pretend to authority over him. - Nothing, therefore, can be of so much consequence to us as LIBERTY. It is the foundation of all honour, and the chief privilege and glory of our natures. (p.6)

He asserts that if our volitions did not originate with ourselves, but with some cause over which we have no power, we should lose this 'chief privilege and glory of our nature'. Yet this is the same Price, who to save the omnipotency of an everactivating deity suggested that volitions follow ideas, and that no man knows whence his ideas come; hence the deity by putting ideas into men's heads, can govern the universe without upsetting natural laws!

In the following sections of his pamphlet he concentrates on Civil Liberty, but proceeds at once to a new conception of it. Civil Liberty no longer is associated with the state, but with the citizen as individual unit. He begins with what is neither anthropologically nor historically true. He writes:

From what has been said it is obvious, that all civil government, as far as it can be denominated free, is the creature of the people. It originates with them. It is conducted under their direction; and has in view nothing but their happiness. All its different forms are no more than so many different modes in which they chuse to direct their affairs, and to secure the quiet enjoyment of their rights. - In every free state every man is his own Legislator. All taxes are free-gifts for public services. All laws are particular provisions or regulations established by COMMON CONSENT for gaining protection and safety. - And all Magistrates are Trustees or Deputies for carrying these regulations into execution. (p.7)

If the 'creature of the people' means that any government ever is or was the creation of the people we are deceiving ourselves; this is only another version of Rousseau's *social contract*, and no state was ever established by such a contract; it has grown up historically in the course of ages from a rule, most probably a tyranny, established by a chief or group of rulers for their own profit, and the people have gradually forced upon it their needs, and limited the powers of their rulers. In other words the 'rights' of the people have been created in the course of time by the pressure individual groups have exerted on the government and are the product of government, not the basis on which it has been created.

Price recognises that his conception of liberty, 'in its most perfect degree', is only possible in a small state, where every member can exercise his suffrage and is capable of being chosen for every public office. He then says that representation is only possible in a large state, and that by this method a free government may be established in the largest state. It is now clear that Price is reducing civil liberty to the same idea of individual freedom as he had formulated for moral, religious and physical freedom, while he had previously defined it as having bearing on the relationship of individual state to individual state. Even in the midst of his description of intra-state liberty, he turns back to the interstate idea, and asserts that any number of states might be subjected to a scheme of representative government. I should like to know whether President Wilson ever studied Price, for throughout Price's pages the blessed phrase 'Self-Determination' abounds.

* * * * *

There is the same obscurity about the 'inalienable rights of men', there is the same adoption of Rousseau's doctrine of the social contract, and the same idealistic philosophy. In the spring of the following year Price published a second tract entitled *Additional observations on the Nature and Value of Civil Liberty and the War with America*, (1777). In this he replied to certain of his critics, and in the following year both pamphlets were reprinted in a single volume entitled *Two Tracts on Civil Liberty*. This work was spread as widely as the first pamphlet. Price was brought into touch with the French Liberals, Turgot, Neckar and Condorcet. But a still more remarkable result followed. On October 6, 1778, still in the thick of the American War, the American Congress resolved:

That the Honourable Benjamin Franklin, Arthur Lee, and John Adams, Esquires, or any one of them be directed forthwith to apply to Dr Price, and inform him, that it is the desire of Congress to consider him as a citizen of the United States, and to receive his assistance in regulating their finances. That if he shall think it expedient to remove with his family to America and afford such assistance, a generous provision shall be made for requiting his services.

Lee's letter to Price urging him to undertake the 'noblest of all works', i.e. assisting 'to form a government which means to make the principles of equal justice and the general rights the chief objects of its attention', has been preserved and is cited by Morgan. Price did not accept this remarkable invitation; notwithstanding all the faults he had found with his own country, he hesitated to desert it, even if he could have done so without committing high treason. Price's own excuse of age - he was then 55, which could hardly be described as he described it 'as advancing so fast into the evening of life, that he cannot think of a removal' - was probably not the real reason. However he assured Congress in his letter of thanks that he had great hopes of the new republic, and that 'he looks to the United States as now the hope, and likely soon to become the refuge of mankind'.

But if the United States could not honour Price by making him their first Chancellor of the Exchequer, they did honour him in another way. On April 24, 1781, two years before the close of the American War, Yale University conferred the Honorary LL.D. on two men and on two men alone. They were General Washington and Dr Richard Price. Once more, before the peace in 1783 was concluded, Price was elected a Fellow of the American Academy of Arts and Sciences on January 30, 1782.

* * * * *

But we have not completed our story of Price's services to America. A last pamphlet entitled *Facts written jointly by Horne Tooke and Price*, in 1780, and reissued in a number of editions, did much - with Yorktown - to bring down the English ministry under North and put Shelburne in power to make peace. But after peace was made Price continued to preserve his interest in America; he not only entered into correspondence with many of its leading men, but he aided them in many ways; he purchased and in part presented a physical apparatus for use at Yale; he gave advice for founding societies for the payment of annuities to the widows of Harvard professors in Pennsylvania and for the widows of congressional ministers in Massachusetts. Meanwhile Dr Benjamin Rush and other Americans urged Price to write a work on America, to insist upon education and upon control by the federal government, and in general to

*Morgan's *Memoirs of Dr Price*, pp. 78-80

discuss the future of the new nation.

As you have staked your reputation upon this great event [the *American Revolution*, K.P.], with the world and with posterity, you must not desert us till you see the curtain drop and the last act of the drama closed. A small pamphlet addressed by you to the Congress, and the Legislature of each of the States upon this subject, I am sure would have more weight with our rulers than a hundred publications thrown out by the citizens of this country. It will only be necessary in this pamphlet to be wholly silent on those subjects in Christianity, which now so much divide and agitate the Christian world. The wisest plan of education that could be offered would be unpopular among 99 out of 100 of the citizens of America, if it opposed in any degree the doctrine of the Trinity.* Price listened to this request and in 1785 he issued a work with the title *Observations on the Importance of the American Revolution and the Means of Making it a Benefit to the World*, T. Cadell in the Strand, 1785. The work is dedicated to the Free and United States of America as a last testimony of the Goodwill of the Author. The work itself is followed by a long letter of Turgot to Price written on March 22, 1778. In some respects it seems to me that Turgot was wiser than Price in his views on Government and America. He recognised that there might be tyranny in a majority as well as in a despot. He recognised that the American congressional and state constitutions were far from perfect. That Pennsylvania exacted a religious test for its representatives, while the Jerseys [*? Delaware*] demanded a declaration of faith in the divinity of Jesus. He saw in the body of representatives, the council and a Governor, only a repetition of the English system of 'balance'. He saw here the possibility of new classes and orders; he thought that the constitution did not pay enough heed to the fundamental distinction between two natural classes, landowners and landless. In short Turgot foresaw class distinctions, religious distinctions and educational differences springing up in America. Turgot feared America would become 'an image of our Europe - a mass of divided powers contending for territory and commerce, and continually cementing the slavery of the people with their own blood' (p. 124). Whether Turgot's view is correct or not none can say. Only the future, when her population is ten times the present and her land exhausted, can show whether Turgot was a true or false prophet. Of Britain Turgot judged more truly than Price, he did not think her case desperate, or that she would become contemptible and insignificant with the loss of her American colonies, he did not believe with Price and the Abbe Raynal that England would be thrown into slavery and 'Europe not able to shew the world one nation in which she can pride herself'. On the contrary he thought English misfortunes would have the effect of a necessary amputation, and 'save her from the gangrene of luxury and corruption'.

*Letters of Dr Price (*Mass. Hist. Soc.*) p. 84.

10.8 Price and the French Revolution

We have still one more phase in Dr Price's life to consider. In it he reaches the summit of his fame; it is the story of the New Academic Institution on a wider stage.

In 1788 the beginnings of revolt had been witnessed in France. In the following year there was the first fighting in the streets of Paris and on July 14 the Bastille was stormed. France was free and King Louis hailed as the restorer of the liberties of France as he had been the promoter of the liberty of America. The spirit of revolution had spread from America, 'a glorious nation vibrated again', and Price saw freedom spreading throughout Europe. Again he dreamed his dream - and actual facts were again to shatter its fabric.

The revolution of 1689 had freed England from the last of the Stuarts, and led to the Declaration of Rights and afterwards the Bill of Rights. That Charter of English liberty had enabled the Dissenters

again to hold up their heads, and a society termed the 'Society for commemorating the Revolution in Great Britain' had been founded. It held its Centenary Meeting at the London Tavern, on November 4, 1789, under the chairmanship of Earl Stanhope. Previously to the dinner Dr Price had delivered to the Society 'A Discourse on the Love of our Country' in the meeting-house in the Old Jewry and this discourse was published in the same year with an Appendix dealing with the population of France, a translation of the Declaration of Rights agreed to by the National Assembly of France, which Dr Price writes 'holds out to the world an instrument on the subject of Civil Government of such consequence' that he could not refrain from inserting it, and making comments on it.

At the Anniversary Meeting a report from a committee of the Society had been presented, drawing up the fundamental principles of the Society and urging the establishment of branch societies to inculcate these principles throughout the kingdom. These principles run:

- (1) That all civil and political authority is derived from the people.
- (2) That the abuse of power justifies resistance.
- (3) That the right of private judgment, liberty of conscience, trial by jury, the freedom of the press, and the freedom of election, ought ever to be held sacred and inviolable.

The report of the Committee concluded by referring to the noble spirit of civil and religious liberty which had so conspicuously shone forth on the continent in the glorious success of the French Revolution, and with the expression of the wish 'that the influence of so glorious an example may be felt by all mankind until tyranny and despotism shall be swept from the face of the globe, and universal liberty and happiness prevail' (Appendix, p. 13).

There is little doubt that Dr Price was a member of this committee. At the meeting itself he moved a Congratulatory Address to the National Assembly of France. This was on November 4, and on October 6 previously there had been the massacre of the King's body-guards, riot and carnage at Versailles, and the King and Queen had been brought back to Paris practically as prisoners. When challenged later Price asserted that he had referred to the storming of the Bastille and not to the later massacre, but the report of those proceedings must have reached England before November 4. All we can say is that Price was too much an idealist,

too little a student of history, to see whether that first taste of blood would lead; but wiser men did see.

Gibbon and Burke had saner views of what would be the outcome of the French Revolution. Price realised the advantages of liberty by revolution in a cold-blooded people like the Anglo-Americans; he had no conception of its effect on a Latin race. Gibbon and Burke had studied history and mankind with a more receptive eye than Price and yet we love him the better for his love of the masses of mankind, whom he generously imagined had his own moral stability. In a letter of December 15, 1789, to Lord Sheffield, Gibbon writes:

The French nation had a glorious opportunity but they have abused it, and may lose their advantages. If they had been content with a liberal translation of our system, if they had respected the prerogatives of the crown, and the privileges of the nobles, they might have raised a solid fabric on the only true foundation, the natural aristocracy of a great country. How different is the prospect! Their King brought a captive to Paris, after his palace had been stained with the blood of his guards; the nobles in exile; the clergy plundered in a way which strikes at the root of all property; the capital an independent republic; the union of the provinces dissolved; the flames of discord kindled by the worst of men (in that light I consider Mirabeau); and the honestest of the assembly, a set of wild visionaries, (like our Dr Price), who gravely debate, and dream about the establishment of pure and perfect democracy of five and twenty millions, the virtues of the golden age, and the primitive rights and equality of mankind, which would lead in fair reasoning to an equal partition of lands and money. How many years must elapse before France can recover any vigour, or resume her station among the Powers of Europe! As yet, there is no symptom of a great man, a Richelieu or a Cromwell, arising, either to restore the monarchy or to lead the Commonwealth.

(*Miscellaneous Works of Edward Gibbon*, Vol. I, p. 208, London 1796.

Edited by John Lord Sheffield.)

Price's motion ran as follows:

The Society for commemorating the Revolution in Great Britain, disclaiming national partialities, and rejoicing in every triumph of liberty and justice over arbitrary power, offer to the National Assembly of France their congratulations on the Revolution in that country, and on the prospect it gives to the two first kingdoms in the world, of a common participation in the blessings of civil and religious liberty. They cannot help adding their ardent wishes of an happy settlement of so important a Revolution, and at the same time expressing the particular satisfaction, with which they reflect on the tendency of the glorious example given in France to encourage other nations to assert the unalienable rights of man-kind, and thereby to introduce a general reformation in the governments of Europe, and to make the world free and happy.

The timid in England might well take alarm, they dreaded an English October 6 and heard beforehand the cries of 'à la lanterne' soon to resound through the streets of Paris. Price had the courage of his convictions, but there was ground for the feelings he and his *Discourse on the Love of our Country* produced. The answer was the work *Thoughts on*

the French Revolution by Edmund Burke, which has lived longer as literature than the Discourse which occasioned it. Horace Walpole wrote that Price's fables had been drawn by Burke and the Revolution Club killed; it was as dead as the Cock Lane Ghost. But if Price was no hero in England, he was worshipped as the 'Apostle of Liberty' in France. The National Assembly expressed its lively and deep sensibility at receiving the address. The Duke de la Rochefoucauld wrote to Dr Price and to Earl Stanhope acknowledging the feelings aroused in France. Patriotic Societies in the French provinces wrote paeans to that invaluable blessing 'Liberty' and how much they valued Dr Price's motion, for 'if not encouraged by the English example and enlightened by your experience, we might still have groaned under the hideous yoke which tryannizes over the faculties of man, enslaves his mind and degrades his nature', - and so forth - and so forth - and the English Revolution Society replied, stating that among the important benefits of the Revolution in France they reckon its tendency to afford a salutary instruction to Kings. . . . They learn with pleasure that the People of France are happy in a King who has encouraged them by his virtues in recovering their Rights and been on this account justly crowned with the title of the Restorer of French Liberty. This elevates him to the highest pinnacles of glory.

The Creator of American Liberty, the Restorer of French Liberty, poor foolish Louis XVI, was a prisoner in Paris; he had seen the massacre of his body guards, and Marie-Antoinette had faced the mob from the balcony at Versailles, - it was but a stage and the crowded tumbrels would daily rattle through the streets carrying Louis himself and wiser men than Louis. But of that Price and the Revolution Society had no foresight - Liberty was an unalienable right of every man. History indeed shows us that the mob which destroys a despot's Bastille almost invariably adapts a Luxembourg palace as a jail for its deliverers.

But it is time to say a word about Price's last work itself, the *Discourse on the Love of our Country*. Its keynote is that we should love our country ardently but not exclusively. We ought to seek its good by all means in our power, but take care to maintain a just regard for the rights of other countries. 'The noblest principle in our nature is the regard to general justice, and that good-will which embraces all the world' (p. 10). Let me cite another passage from what was in its day almost as noteworthy as the *Observations on Civil Liberty*, the doctrines of which it expands as well as emphasises:

Ignorance is the parent of bigotry, intolerance, persecution and slavery. Inform and instruct mankind; and these evils will be excluded. - Happy is the person who, himself raised above vulgar errors, is conscious of having aimed at giving mankind this instruction. Happy is the Scholar or Philosopher who at the close of life can reflect that he has made this use of his learning and abilities: but happier far must be he, if at the same time he has reason to believe he has been successful, and actually contributed, by his instructions, to disseminate among his fellow-creatures just notions of themselves, of their rights, of religion, and the nature and end of civil government. Such were Milton, Locke, Sidney, Hoadly &c. in this country; such were Montesquieu, Fenelon, Turgot, &c. in France. They sowed a seed which has since taken

root and is now growing up to a glorious harvest. To the information they conveyed by their writings we owe those revolutions in which every friend to mankind is now exulting. - What an encouragement is this to us all in our endeavours to enlighten the world. (pp. 13-4)

America, France, and - as Price and Paine hoped - soon England! What encouragement did the revolution give to the thinkers? Paine, imprisoned, only just escaped the guillotine, Condorcet escaped it by poisoning himself in prison, and Price was to die perhaps a disappointed disillusioned man, two years later, the fabric of his last dream about to be shattered. 'A la lanterne' with those who think for the people! After all the friction was very great and progress very slow, but is England today in political freedom behind be it America, France or Russia because she has escaped a revolution? Which nation first abolished slavery, which first enfranchised women? - There is a slow evolution, which in the long run achieves as much as the revolution desired by Price. Yet there is sound sense in much that he writes in this Discourse, when it does not degenerate into rhetoric. Thus:

Civil Governors are properly the servants of the public; and a King is no more than the first servant of the public, created by it, maintained by it, and responsible to it: and all the homage paid him, is due to him on no other account than his relation to the public. His sacredness is the sacredness of the community. His authority is the authority of the community; and the term MAJESTY, which it is usual to apply to him, is by no means his own majesty, but the MAJESTY OF THE PEOPLE. For this reason, whatever he may be in his private capacity; and though, in respect of personal qualities, not equal to, or even far below many among ourselves - For this reason, I say, (that is, as representing the community and its first magistrate), he is entitled to our reverence and obedience. (pp. 23-4)

The peroration must be given, if not for the depth of its understanding of humanity at least for the splendour of its rhetoric: You may reasonably expect that I should now close this address to you. But I cannot yet dismiss you. I must not conclude without recalling, particularly, to your recollection, a consideration which I have more than once alluded, and which, probably, your thoughts have been all along anticipating: A consideration with which my mind is impressed more than I can express. I mean the consideration of the favourableness of the present times to all exertions in the cause of public liberty.

What an eventful period is this! I am thankful that I have lived in it; and I could almost say, 'Lord, now lettest thou thy servant depart in peace, for mine eyes have been thy salvation'. I have lived to see a diffusion of knowledge, which has undermined superstition and error - I have lived to see the rights of men better understood than ever; and nations panting for liberty, which seemed to have lost the idea of it. - I have lived to see THIRTY MILLIONS of people, indignant and resolute, spurning at slavery, and demanding liberty with an irresistible voice; their king led in triumph, and an arbitrary monarch surrendering himself to his subjects. - After sharing in the benefits of one Revolution,

I have been spared to be a witness to two other Revolutions, both glorious. - And now, methinks, I see the ardor for liberty catching and spreading; a general amendment beginning in human affairs; and the dominion of kings changed for the dominion of laws, and the dominion of priests giving way to the dominion of reason and common science

Be encouraged, all ye friends of freedom, and writers in its defence! The times are auspicious. Your labours have not been in vain. Behold kingdoms, admonished by you, starting from sleep, breaking their fetters, and claiming justice from their oppressors! Behold, the light you have struck out, after setting AMERICA free, reflected to FRANCE, and there kindled into a blaze that lays despotism in ashes, and warms and illuminates EUROPE! Tremble all ye oppressors of the world! Take warning all ye supporters of slavish governments, and slavish hierarchies! Call no more (absurdly and wickedly) REFORMATION, innovation. You cannot now hold the world in darkness. Struggle no longer against increasing light and liberality. Restore to mankind their rights; and consent to the correction of abuses, before they and you are destroyed together. (pp. 48-51)

Price had left the Bishops and Archdeacons to fight it out among themselves and joined the politicians. Burke replied to Price. Priestley replied to Burke. Mackintosh and Tom Paine joined the fray and the echoes of it were only silenced by those cries from the boulevards of Paris, 'a la lanterne, a la lanterne!'

Yet Price's fame as author of the *Love of our Country* spread far and wide. The French termed him the 'Great Apostle of Liberty', the Constitutional Society dined on December 16 and Dr Price was present. The first toast was 'The Majesty of the People', the second was 'Dr Price, the Friend of the Universe'. Then comes the dinner of a Society for commemorating the taking of the Bastille. Price proposes on July 14, 1790, the toast: 'An alliance between France and Great Britain, for perpetuating peace and making the world happy'. Price's address, we are told, was 'a high-toned expression of joy that the "glorious Revolution" which they were celebrating promised a new and better order of human affairs'. France and Britain between them were to cry 'Peace' and there would be Peace. Then comes a last dinner, the next anniversary of the Revolution Society, Price though in failing health is in the chair, not Earl Stanhope. He proposes a toast - 'The Parliament of Britain, May it become a National Assembly'. He was unable to deliver his oration on the toast. Afterwards he said that he meant by it that the British Parliament should be a truly representative body. It was not unreasonable interpreted to mean that he wanted it to resemble in character and opinions the French National Assembly.

Early in February 1791, in inclement weather, Price officiated at a funeral in Bumphill Fields and remarked that 'such a method of conducting funerals was a sure way of sending the living after the dead'. It would appear that in his depressed state this and a second funeral emphasized his illness and he died on April 19, 1791. At the dinner on July 14 to commemorate again the Bastille one toast was now 'to the Memory of Dr Price and those illustrious Sages who have enlightened Mankind on the true principles of Civil Liberty'. That dinner became notorious, for as a consequence of it the mob attacked Dr Priestley's house

and burnt his books, apparatus and manuscripts. Thus the mob treats 'apostles of liberty'. In France it was said that 3,000,000 persons went into mourning for Price.

Dr Price, that friend of Man, is dead, all France has shed tears for this implacable enemy of Tyrants, for this large-hearted defender of Liberty. Dr Price, the Apostle of Humanity, the honour and glory of a rival but generous Nation. Price and Mirabeau have ceased to be, but their sensitive and burning souls are now reunited in the bosom of the Deity. Price and Mirabeau, immortal names, become a sign for rallying all the real patriots, and friends of the truth!

Even the French National Assembly went into mourning for six days. The exuberant Frenchmen expatiated on the exuberant Welshman. They might as Calais returned Price as a member of their National Assembly - even as they treated the latter. They would have admitted the truth and sent him to prison and possibly to the guillotine because he belonged by birth to that accursed nation the English, and voted for the exile and not the death of that despot Louis XVI.

Price's last scientific work was to prepare a fourth edition of the *Reversionary Payments*, but he was too feeble to complete the second volume and it had to be entrusted to his nephew William Morgan. You may ask me to sum up and describe in a few words Price's character. I find it difficult to do so. He was not a great mathematician, but he saw the importance of mathematics in social problems. He was an advanced theologian for his age, but he had not any real insight into the workings of nature, and his natural theology seems unreasonable to post-Darwinian thinkers. He stopped too, at a limit, and Voltaire, and morally, which had been long overstepped by Montesquieu, a simplicity, a benevolence and still more a fire in Price, which was largely lacking in these men of the head. He was a great preacher, a fervid orator like so many of his race; with these gifts he could dispense with definition, nay largely with logic. What I may call the historic and anthropological senses were wholly wanting in his make up. But he could touch men's hearts, if he overlooked their reasoning powers. He thus became a force in England, in America and in France. If it is good to be spiritual without being markedly intellectual, such was Price; he could grip and hold men, especially when he appealed to their desires for greater self-determination. Condorcet was probably right in saying that Price was one of the formative minds of the 18th century, but the statement must be interpreted in the sense of which I have spoken that the idealists provided the flags under which we march, or the rags which clothe men's naked appetites.

Gibbon and Burke with more historic sense saw that the French had had a glorious opportunity and had lost it. They interpreted rightly that 6th day of October in Versailles. I will not condemn Price for trusting humanity, when humanity is not to be trusted. It made him more loveable, if less safe as a leader of men, and this the caricaturists of the day saw better than Price's friends; he was like Mirabeau and would have danced in a barrel of gunpowder with utmost innocence. But

I would not conclude with my personal estimate. What his friends thought of him is perhaps truer, they saw through the spectacles of their own age, while we are evolutionists.

Price's funeral service was conducted by Dr Andrew Kippis, one of the Unitarian fellows of the Royal Society and the extremely able editor of the great *Bibliographia Britannica*. His address of April 26, 1791, contains, however, little but the customary eulogy of such occasions; there is no real characterisation. On the other hand the sermon of another F.R.S., Priestley's oration at Hackney on May 1, 1791, has more permanent value. A few lines may be quoted here to indicate how Price's friends and contemporaries thought of the man whom the National Assembly of France had styled the 'Apostle of Liberty', and on whom the University of Yale on April 24, 1781 - two years before the end of the American War - conferred the honorary degree of LL.D.

In the writings of Dr Price men and citizens may ever see their rights, and magistrates their duty; and so plainly and forcibly are these lessons given that our children may understand and feel them. That the great end of civil society, and the object of all civil government is the public good; that every form of government is excellent in proportion as it is adapted to gain this end, that all persons employed and paid by the public are the servants of the public, and that they are accountable to the public, and of course punishable for their neglect of duty, are now considered as axioms, as indisputable as any in geometry; and the writings of Dr Price have contributed more than those of any other person, I may almost say living or dead, to make them generally understood, and what is more, to their importance being truly felt. (p.9)

It may be considered as an universal truth, that no man can rise to great eminence without having enemies in proportion to it; and few men have had more of this honourable appendage to real merit than Dr Price. He long stood the object of reproach and calumny to the interested tools of power, to the prejudiced and to the timid. And on this account some may think it necessary to apologize for his conduct, in the writings to which I now refer, especially as his profession was that of a preacher of the gospel of peace. But I cannot apologize for public virtue, and public spirit in any man. It is universally praiseworthy, and a just subject of encomium. (p.10)

Priestley, Condorcet and Benjamin Franklin, gave judgments more favourable to Price than I should, and Price ought to be judged by his own age, not ours.

MEMOIRS

OF

THE LIFE

OF

THE REV. RICHARD PRICE,

D.D. F.R.S.

BY

WILLIAM MORGAN, F.R.S.

London:

PRINTED FOR R. HUNTER, SUCCESSOR TO J. JOHNSON,
NO. 72, ST. PAUL'S CHURCHYARD;

AND R. REES, NO. 62, PALL MALL.

1815.