Two patients in the control group had carcinoma of the stomach discovered less than six months after a barium meal for haematemesis had shown nothing abnormal. In the endoscopy group two of the four patients with a carcinoma of the stomach also had barium meals within 48 hours of admission and in neither were the carcinomas diagnosed radiologically. In one it was an early carcinoma which had not invaded the adventitia and therefore it had a good prognosis. Endoscopy would probably have diagnosed the carcinoma in the two control group patients with normal barium meal findings had it been performed at the first admission.

This study aimed to discover whether the increased accuracy and speed of diagnosis provided by emergency endoscopy results in definite benefit to the patient. The two study groups were comparable as regards age, sex, and previous episodes of bleeding. The endoscopy group had slightly more severe haemorrhages in that more patients needed blood transfusions and they each needed more blood. There was a considerable difference in the mortality of the two groups—5.7% in the endoscopy group and 15.2% in the controls. The groups were not large enough for this to be statistically significant, but routine emergency endoscopy would probably reduce the mortality from gastrointestinal haemorrhage.

The surgeons were the same in both groups and the incidence of operations in both was remarkably similar. The delay before operation was significantly shorter in the endoscopy group, however. Presumably this was because an accurate diagnosis was made rapidly, and therefore a decision regarding management could be made more easily. In the control group five patients had no diagnosis before operation, in nine the diagnosis was found to be totally wrong at operation, and five had laparotomies during which no cause of bleeding was found. These three phenomena did not occur

at all in the endoscopy group. The operative mortality in the endoscopy group was 14.3% compared with 25.9% in the controls. The hospital stay of those patients who survived and did not require an operation was significantly shorter in the endoscopy group, as the diagnosis could be made with certainty.

CONCLUSIONS

Emergency endoscopy should be performed in patients with acute upper gastrointestinal haemorrhage as soon as practicable and certainly within 48 hours of admission. Radiology is unnecessary in most cases and should not be performed until after endoscopy. Endoscopy provides an accurate diagnosis, probably gives an earlier diagnosis of carcinoma, and probably reduces the mortality. It causes less delay before operation, more correct diagnosis before operation, and fewer laparotomies where no site of bleeding is found. Patients who do not have operations have a shorter stay in hospital if a quick diagnosis is made by endoscopy.

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Outside Medicine

Sir William Petty

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The life of Sir William Petty was one of unusual range and achievement even in the heroic seventeenth century. He was an authentic product of the English people at a time when it was entering the public stage previously reserved for noble lords and prominent servants of the Crown.

Petty was born in Romsey, Hampshire, on 26 May, 1623, the son of a small clothier. There he acquired as much education as could be found in a sleepy country town and went to sea as a cabin boy on a cross-channel ship. When he broke his leg and was left at Caen to fend for himself, he managed to study for a year at a French Jesuit College. As a sailor he scraped together enough money to study in Holland and France. In

Paris he acted as an amanuensis for Thomas Hobbes, with whom he read Vesalius.

Dr. Petty

Though his intellectual interests were very wide, with a strong mathematical bent, it was during his time abroad that he began to concentrate on medicine, and particularly on anatomy. After his return to England in 1646 he combined medical studies at Brasenose College, Oxford, with earning a living in and around London, mainly through the preparation of anatomical specimens and other laboratory work, for his numerous inventions remained unsuccessful. In March 1650 he at last became Doctor in Physics at Oxford and a few months later a candidate of the London College of Physicians.

Oxford University had been a stronghold of royalism in politics and of scholasticism in philosophy, and the victorious Commonwealth had to replace several recalcitrant opponents with its own supporters. Dr. Petty was first made a Fellow

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and soon afterwards Vice-Principal of Brasenose College and became Professor of Anatomy at Oxford at 27. As deputy professor he had suddenly sprung into fame for the "Raising of Ann Green," a poor servant girl hanged for concealing a miscarriage. Petty procured her body in advance for his anatomy lessons and he and one of his academic friends, Dr. Willis, restored her to life.

Sir William Petty, 1623-1687, (Painting by Isaac Fuller. Reproduced by courtesy of the National Portrait Gallery.)

Down Survey of Ireland

Within a few weeks of his inaugural lecture as Professor of Anatomy Petty obtained two years' leave of absence from his Fellowship, and within a few months he was appointed personal physician to the commander-in-chief of the English army of occupation in Ireland and physician to the Army. His salary, other emoluments, and the right to private practice produced an income of about £800 a year, which was a very large sum in terms of mid-seventeenth century values. But doctoring in Ireland was soon overshadowed by more important and much more lucrative occupations which put an early end to his medical career.

Like most colonial exploits, the reconquest of Ireland after the Great Rebellion of 1641 was partly an act of imperial policy and partly a commercial speculation. It was financed by loans advanced by so-called "adventurers," and the funds for repaying them and for paying the soldiers who were carrying out the grim operation were to be provided by the reconquered land itself, which was to be physically divided between these claimants. Nevertheless, this was more easily promised than performed, for the surveying of such a large area (which war and rebellion had reduced to a thicket of heath and bog) was a task beyond the ability of any member of the civil and military administration—except Dr. Petty.

The aim which Petty set himself, and which he undertook to carry out in 13 months, was much more fundamental. He wanted to produce a complete and authentic record of two-thirds of Ireland in detailed maps (and for this reason known as the "Down" Survey), and Petty achieved it by tackling the job like a modern industrial operation. He employed about 1,000 persons, most of them common soldiers, whom he

specially trained for the actual field work, while the few professional surveyors concentrated on the most difficult tasks. The work was completed by March 1656 and yielded Petty a net profit of at least £9,000 which he employed in buying up land claims at a fraction of their nominal value. As a result he became one of the largest proprietors of Irish land and these possessions remained the core of his growing fortune, and the source of bitter vexations and interminable law suits for the rest of his life. They were passed on in due course to the Lansdowne family, whose ancestor Petty became through his daughter.

Frustrated Celebrity

Though Petty had faithfully served the Protectorate (and was very close to Henry Cromwell, Oliver's younger son), he was knighted soon after the Stuart Restoration. He was well liked by both Charles II and James II, but neither of them was willing to employ him in any prominent capacity and his many proposals for administrative and fiscal reforms were invariably ignored. He was a founder member of the Royal Society and widely admired for his intellectual brilliance but suffered keenly from his total lack of practical influence. He died on 16 December 1687 as a very rich man, though the full extent of his fortune was obscured for some time by the political convulsions in Ireland connected with the fall of the Stuarts and the resistance against the House of Orange.

If Petty's name is remembered outside the circle of the aristocratic family which he helped to found, it is not for his successful, and more than a little unscrupulous, acquisitions of land and property which absorbed so much of his best energies; nor even for his inventions, which contributed a great deal to his contemporary reputation—particularly at the Court of Restoration England. Unlike most successful buccaneers in troubled times, Petty was not simply a ruthless and crafty adventurer but an original thinker with a powerful urge to account to himself for what he was doing and to understand the outside world, and particularly the motive sources of the society of his day.

Literary Heritage

Writing was second nature to Petty, though his spelling was unorthodox even by the standards of his time, and he left a very large mass of papers most of which were preserved and ultimately published, but his formal literary output was very modest. Apart from his great geographical work on Ireland (*Hiberniae Delineatio*), his main writings were the *Treatise of Taxes and Contributions*, written soon after the Restoration of the Stuarts and published in 1662; the *Political Anatomy of Ireland*; the *Political Arithmetick* (both of which were published soon after his death); and the *Treatise of Ireland* (which like many other essays, appeared in print more than two centuries later). He also published in his lifetime a number of short essays on a variety of subjects, while others of great intrinsic importance appeared posthumously.

His writings were, as he fairly claimed, "cramped with a sort of dry matter and describe the truth of things." His style was terse, direct, bold, and original but without literary graces, much more that of a man of action than a scholar.

Political Arithmetic and Statistics

During Petty's lifetime characteristically "modern" tendencies gained the upper hand in philosophy and mathematics, while natural science achieved its first great successes in physics and chemistry. As a founder member of the Royal Society, Petty was in close touch with many of these developments, and, when Newton's *Principia* was published a few months before

his death, he enthusiastically praised "Mr. Newton's book" and wrote that he would "give £500 to have been the author of it and £200 that Charles [his eldest son] understood it."

Mathematics was an eminently practical technique for him; comparable to a skilled trade—applying certain tools to certain materials with the help of good workmanship in order to produce its specific results which were "the finding out abstruse truths and out of a few truths to draw out infinite true conclusions." His own major original contribution to the advance of science was the use of quantitative methods for the analysis of social and economic facts for which he coined the name "political arithmetic." The mathematical tools he employed for this purpose were very simple and many of his conclusions were extremely rough and ready, but they lent precision to many of his striking insights as an original social and economic thinker.

At the same time, he was closely involved in another application of the method of "number, weight and measure" to the facts of human life which was one of the milestones in the development of the modern science of statistics—the *Observations upon the (London) Bills of Mortality* by his close friend Captain John Graunt. Petty's exact share in this work is unknown but it was almost certainly substantial. Probably in the first place he was responsible for suggesting the subject to Graunt, and it is particularly likely that he was the author of the striking conclusions at the end of the work which impressed the contemporary world much more than the careful and painstaking analysis of the material by Graunt which was mainly appreciated by later statisticians.

"Classical" Economist

Whatever Petty's share in the foundation of modern statistics, his contribution to the creation of a separate economic science must be rated very highly. He started from the basic realities of a given territory and its population—"lands" and "hands", with population as the dynamic element. He estimated that of the six million inhabitants in England, "the whole stress" lay upon the equivalent of about 1,800,000 "labourermen." From this approach it was only a step to the solution of what was to him the most important problem of political economy: to find a "universal measure" which would make it possible to "make a Par and Equation between lands and labour." This common measure of value he found, not in a day's labour, but in the day's food of an adult man which "seems to be as regular and constant as the value of fine silver." He was thus responsible for an acute formulation of the labour theory of value which dominated economic thought for two hundred years and whose influence is kept alive today through Marxism. He propounded theories of rent and money which were first-rate achievements in his time and which occupy an important place in the history of economic doctrines. Perhaps even more important for his stature as a thinker, his strictly economic ideas flowed from a pool of ideas on society in general which were both original and consistent—and which were at least coloured by his medical background.

Political Anatomist

"Organic" metaphors for social problems were, of course, always widespread and by no means confined to writers with a medical education. Thus it means little if Petty says that "Labour is the Father and active principle of Wealth, as lands are the Mother." He uses his medical expertise to rather greater effect when he dismisses the opinion that money is the "blood" of society and describes it as "but the Fat of the Body-Politick, whereof too much doth as often hinder its Agility, as too little makes it sick. 'Tis true that as Fat lubricates the motion of the Muscles, feeds in want of Victuals, fills up uneven Cavities, and beautifies the Body, so doth Money in the State quicken its Action, feeds from abroad in the time of Dearth at Home; even accounts by reason of it's divisibility, and beautifies the whole, altho' more especially the particular persons that have it in plenty." This passage is a good illustration of Petty's style, including the sardonic humour and the total freedom from cant in the coda; the detailed comparison obviously indicates greater familiarity with both elements of the analogy than writers on economic affairs may commonly have had, but it would hardly be enough to claim that his medical training had any special importance for his mental universe.

More suggestive is the fact that Petty described his specific method of employing quantitative measurement as the key to a knowledge of society as "political anatomy," and in the preface to his *Political Anatomy of Ireland* he makes it clear that this was much more than a mere form of words: "Sir Francis Bacon, in his *Advancement of Learning*, hath made a judicious Parallel in many particulars, between the Body Natural and Body Politick. . . . And it is as reasonable, that as Anatomy is the best foundation of one, so also of the other; and that to practice upon the Politick, without knowing the Symmetry, Fabrick, and Proportion of it, is as casual as the practice of Old-women and Emphyricks." His whimsical elaboration of this parallel to the experimentation *in corpore vili* (of Ireland) and the use for his dissection of "a commin Knife and a Clout" instead of a "variety of proper Instruments" shows that he took the matter very seriously. In fact, his new enterprise of realistic social analysis represented a marriage between the two intellectual poles of his youth—mathematics and anatomy.

But if the professor of anatomy turned social thinker looked at society with the eyes of a doctor, he also looked at the medical practice of his day as a clear-headed social thinker and reformer. At the time of the Great Plague he proposed the removal of the sick from the danger spots and their treatment by matrons and surgeons "the charges to be general." In the fragment of an anatomy lecture, when he was over 50 and had not practised medicine for many years, he called for hospitals for all classes of society, "to differ only in splendour but not at all in the sufficiency for the means and remedy for the patients' health"—and even came out in favour of a state medical service of salaried doctors.

Though Petty has no place in the history of medicine, the man who carved his niche in the history of Ireland in the seventeenth century and in that of social and economic science recognizably remained the student of Vesalius in Paris and the Professor of Anatomy at Oxford.