Poisoning as a social phenomenon
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The word ‘poison’ is derived from the same Greek source as ‘potion’, meaning a draught or something swallowed. That is logical enough, for it was the habit of the malefactors in olden days surreptitiously to slip their lethal nostrums into their intended victims’ food, or drink.

The accounts of poisoning over the ages afford fascinating reading [1-4]. Four hundred years BC, the death sentence was imposed upon Socrates by drinking the hemlock cup. Then there was that progenitor among the clinical immunologists, Mithridates IV, King of Pontus around 200 BC. Forever in terror of being poisoned by his enemies, he swallowed in succession an ever-increasing range of toxic substances, at first in very small doses and then, progressively, by increasing the amounts. His aim was to induce in himself what might be regarded as a polyvalent resistance. Whether his technique proved effective was never properly confirmed, for he survived to a venerable age and eventually died in battle. In Homer’s Odyssey, Telemachus sought a deadly poison in Ephyra that he might discreetly introduce into the wine so as to dispose of his mother’s suitors—a fierce counter to amorous advances. In Ancient Rome, the notorious Nero, deftly encouraged by his sinister, if not voluptuous, consort, Locusta, embarked upon a wanton orgy of poisoning by which literally hundreds of people came to an untimely and precipitate end. Later came the Borgias, who had no scruples about riddling themselves of enemies, rivals, troublesome husbands (and wives) and even wealthy relatives with such elegant skills that it became the fashion:

To carry death in an ear-ring, a casket, a signet, a fan-mount, a filigree basket.

So to France and ‘le Grand Siècle’, when the Marquise de Brinvilliers in Paris ‘experimented with hospital patients, giving them poisoned confectons and wines and amusing herself by watching the effects’—truly a macabre hobby.

Poisoning was not exclusively by the oral route. For Hercules is said to have died from wearing a shirt ingeniously poisoned by his wife. Hamlet’s father died when the uncle ‘stole with juice of cursed hebron in a vial and in the porches of the car did pour the leperous distilment.’ More factually, in 17th century Naples, that arch-villain, Toffana, purveyed a concoction under the guise of a cosmetic which, applied to the skin, soon had a lethal effect.

There was also the case of Dr Lopez FRCP, a Portuguese physician who enjoyed a thriving practice in London and was a consultant to St Bartholomew’s Hospital. Persuaded, it was supposed, by King Philip IV of Spain, the said Lopez ingratiatingly presented a poisoned ring to Queen Elizabeth I. He was, however, detected and, confessing under duress, was duly executed for his pains in 1594.

A more intriguing stratagem gained favour in 17th century France, whereby an irritant material was incorporated into the nether garments of a man. On wearing these an inflammatory reaction would develop in the genital area. Physicians would thereupon diagnose syphilis and prescribe injunctions of mercury. These would be so generously applied by the duplicitous wives that, ere long, fatal systemic mercurial poisoning would ensue. Any Jezebel so implicated would ‘earn additional praise for her saint-like charity to a husband whose sufferings were the result of misconduct which most women find it difficult to forgive.’

Toxicology

We owe the origin of the term ‘toxin’ to the Greek word relating to archery, as in ‘toxophily’, for it was a device among certain hunters to daub the tips of their arrows with poison, classically curare, so that the trauma dealt upon their prey extended widely beyond the initial, physical wound. Upon this odd basis the modern scientific study of poisoning has been graced with the title of toxicology.

Forensic toxicology

My few historical references have dwelt upon wilful and offensive acts of poisoning by individuals against other individuals; in short, a pattern of criminal behaviour. It might be argued that this was an expression of the prevailing social mores. However, in an enlightened and civilised society, with any respect for moral principles, such conduct is outlawed. In Britain, therefore, such deliberate poisoning contravenes the Offences Against the Person Act, 1861, quite apart from the relevant provisions of the Common Law.

Yet, high-minded societal aspirations and elaborate legislation will avail little unless there are the resources to discover such crimes and assemble convincing evidence to
gain a conviction at a court hearing. These were not feasible in former times. The allegations then in circulation were founded on little more than circumstance, suspicion, motive and assumption which are still powerful influences in reaching condemnatory conclusions about poisoning of another kind today. That is why scientific validation is so critical.

Until the nineteenth century, there was very little perception of the true aetiology and pathology of natural diseases and, less still, of the exact effects of alien materials in the body. Only when morbid anatomy, supplemented by histopathology and, later, by microbiology and clinical chemistry had become sufficiently advanced as to be correlated with the clinical history could so many of the nosological entities be characterised. For toxicological diagnoses, however, exacting chemical analyses were required as well. By 1836, Marsh had devised a reliable test for arsenic in the body. Simultaneously came the era of Orfila (1787-1853), a native of Minorca who spent the greater part of his professional life in France [5]. He, by the assiduous application of analytical techniques to the investigation of suspected poisoning, first elevated forensic toxicology to the status of a science. It was asserted, however, that his fame was enhanced as much by his flair for cutting a dramatic figure in the witness box as it was by the veracity of his testimony. Not so spectacular but no less industrious in this field were Christison (1797-1882) in Scotland and Alfred Swaine Taylor (1806-1880) in London, during the latter’s tenure of a lectureship in medical jurisprudence and chemistry at Guy’s Hospital [6].

Since then this discipline has gained enormously in its coverage, precision and standing, so that today the forensic scientist commands techniques that are as extraordinarily sensitive as they are specific. Yet this mastery is not entirely devoid of its fallacies. Mere presence must not necessarily be equated with causation. The observed injury must correspond with the toxic attributes of the alleged agent. Dose and response must be in accord. Confounding factors, such as the contribution of existing natural diseases, must never be disregarded. Vigilance is needed also for other interfering mechanisms, like post-mortem contamination of the body with arsenic from extraneous sources (eg soil and embalming materials) or, as in the case of the Moorgate train disaster of 1975, alcohol being spontaneously generated by enzyme action in the tissues after death.

Nevertheless, the modern resources of forensic pathology and toxicology for investigating criminal poisoning, coupled with the statutory control over the sale and supply of the more toxic agents, enshrined in the Poisons Act 1972, have ensured a high probability of apprehension, arraignment and conviction in homicidal poisoning. Today, in Britain, this type of crime constitutes more of an individual aberration than a social phenomenon.

Self-poisoning

Medical practice, however, still has its pervasive toxicological interests. I have in mind suicide and attempted suicide. In any society, irrespective of its prosperity, there always seems to be a few people who are so mentally depressed and desperate that they resolve to take their own lives. Characteristically they go about the task with determination. They may shoot, drown, hang or gas themselves, or throw themselves under trains, seldom thereby leaving anything to chance. If they choose, instead, to poison themselves, they usually take a massive overdose of drugs of which there never seems to be a dearth. So armed, these miserable souls lock themselves into a room, pen a farewell note and proceed to ingest such a surfeit of the selected drug, or drugs, that a fatal outcome prior to discovery is virtually assured. It is not possible entirely to mitigate against these sad events. It is somewhat reassuring that while, over recent years, drugs and medicines have featured more prominently in these acts of self-immolation, the total incidence of suicide has not risen.

Of much greater magnitude nowadays is the prevalence of self-poisoning, again very largely from the swallowing of overdoses of drugs. Whereas some of these people may never come under medical care, the majority of them arrive at hospital. In 1958 the total number of admissions on this account for England and Wales numbered about 20,000. Twenty years later that figure had grown progressively to over 120,000. Thankfully, since 1978, the graph has levelled out, though it shows little inclination to descend. Indeed, this continuing ‘epidemic’ of self-poisoning results in this condition today being the commonest single form of medical emergency. All but a small minority of these patients recover; their inpatient mortality is less than one per cent. This outcome probably reflects more upon the mildness of their intoxication than upon the skills of their physicians. Most of these patients are fit for discharge after only a day or two in the wards.

It is generally agreed that this vast population of self-poisoners falls into quite a different category from those decisively intent upon suicide—perhaps with a little overlap. The former do not set out to die, although they sometimes resort to the wrong agent, or miscalculate the dose. Predominantly they are chronically depressed, lonely, deserted, helpless, resigned and introspective creatures, not wanting to abandon altogether from existence, but just seeking temporary escape. In the short term this is just what they achieve. From being neglected and bereft of sympathy they find, upon being discovered, the whole attitude of those around them changes. Relatives, neighbours, hospital staff and the like extend kindness and compassion, so affording enormous relief to the benighted subject.

With the recognition that the mental distress enshrouding these sad people was quite out of proportion to the physical harm that they commonly inflicted upon themselves, the medical emphasis shifted from the organic to the psychiatric aspects. They were, it was averred, simply ‘uttering a cry for help.’ Acting on expert recommendations the Health Departments in Britain issued a circular as long ago as 1961 instructing all hospital authorities to ensure that, for every self-poisoned patient, a psychiatric interview should be accorded prior to discharge [7].

Professor Neil Kessel in his Milroy Lecture of 1965 [8],
asserted that self-poisoning presented 'toxicologists, psychiatrists and public health doctors with problems that must be answered.' In his studies in Edinburgh, he found that high rates of this behaviour were associated with living in over-crowded, poor surroundings and adverse social conditions. The notably high incidence among women between 20 and 40 years of age was attributed to their unhappiness in relative social isolation, with no opportunity for sharing their dissatisfaction and morbid feelings with sympathetic associates. Marital disharmony often impinged. Few of these individuals qualified for a diagnosis of substantive psychiatric illness, whereas personality disorders were frequent. By contrast, material misfortune, eg debt or unemployment, was an uncommon precipitating factor. More significantly, the background was that of an 'intolerable, yet insoluble, social situation.'

Professor Kessel urged a drastic restraint on the prescribing by doctors of drugs likely to be taken in overdose, and inveighed against the ready accessibility of analgesics such as aspirin and paracetamol.

Twenty-two years later, the burden of self-poisoning up and down the land remains undiminished. Largesse in the prescribing of psychotropic drugs apparently persists, while aspirin and paracetamol remain on unrestricted sale.

What, moreover, has the ordained psychiatric interview amounted to in practice? In this regard I concede that I might be prejudiced. To me, patient after patient, fully restored to physical health, lingered in a bed much needed for another admission while waiting for the psychiatrist to arrive. Eventually the consultation would take place and the psychiatrist would pronounce the absence of any formal psychiatric disease, arrange an outpatient appointment and prescribe a battery of drugs more than sufficient to fuel a repetition of the original episode. Not surprisingly, we cultivated a legion of recidivists, one of whom embarked on this sort of adventure more than 20 times.

Social implications

It was in 1977 that Gardner and his colleagues demonstrated that the patients for whom this pre-discharge colloquy was entrusted to ordinary members of the medical firm subsequently fared no worse than those who had received the benefit of specialist psychiatric assessment and guidance [9]; nor did they fare any better—which might have been predicted. For as Kessel commented, 'We cannot alter the disturbed backgrounds from which the patients come ... the action required is political, and not medical.' For this self-poisoning is brought about by social pressures imposed from without upon susceptible individuals and statutory provisions are quite inappropriate. This is a social phenomenon amenable only to radical changes in the domestic, occupational and community environment in which these sufferers are obliged to exist.

What can be done about this? Some years ago we made serious representations to the DHSS, but nothing came of our overtures. The prospect for ameliorating the present unsatisfactory state of affairs is too bewildering, complicated and daunting, for politicians and community physicians alike. Proclaiming a policy for, say, cardiac surgery is much more explicit and dramatic, so it attracts priority. In my view this epidemic of self-poisoning comes well within Dr Milroy's concept of a 'mal de misère.' If so much ignorance and confusion attends this social malaise in 1987, then I cannot believe that the challenge of tuberculosis was any less baffling in his day. As he wrote of that disease, 'The subject is ... too important in its practical bearings not to demand strict impartial scrutiny.' The devastations of self-poisoning warrant a similar, serious approach. Medical treatment is effective so far as it goes, while personal psychiatry has palpably failed. So the aetiology of this disease must be unravellable by dispassionate social studies in order to mount effective prevention. As Mills and Eden commented, by contrast to the advances made in occupational health, '... practically nothing is known of the biological effects of the way people spend the rest of their lives' [10]. Socially, self-poisoning must come within their category among the 'failures of homeostasis.' To remedy this is truly the urgent business of community medicine.

Child poisoning

Before leaving the topic of acute poisoning, mention must be made of that which overtakes small children. Some charitable institutions, local authorities, national politicians, government departments and the media, not without support from paediatricians and their associated health workers, have combined to propagate horrifying stories about ubiquitous toxic products that pervade our homes, gardens, schools, and fields to strike widespread death and disaster into our progeny. Warranting these warnings, it is claimed, are the statistics that show, each year, no less than 18,000 children being admitted to the hospitals of England and Wales with the diagnosis of poisoning [11]. Further scrutiny, however, reveals that most of these youngsters are found to be unharmed, or overtaken by the most minor symptoms, and they are discharged after only an overnight stay. The deaths—each one, inexcessably a calamity—number about 150 per annum and, of these, more than 100 are victims of carbon monoxide, not from household gas, nor from car exhausts, but as sequelae to domestic conflagrations. Of the remainder, the majority succumb from the swallowing of medical capsules and tablets, carelessly left within their reach. Rarely, as it transpires, are household products to blame.

The social accompaniments are obvious. It is perilous ever to leave small children alone in the home, denying them adult care. All medicines should be stored securely and beyond the reach of small hands. Child-resistant containers should be mandatory for all solid-dose forms of medicines, though strip, or 'bubble', packs are preferable to the reclosable containers, because the lids of these are frequently not replaced and children display a remarkable knack for opening them anyway, sometimes with the encouragement of an elder sibling. Moreover, in the broader social context, it might be more sensible not to
Persist with alarmist propaganda, but to give parents credit for some intelligence and to offer them more discriminating guidance. Finally, on the hospital side, surely it must be feasible to organise our accident and emergency departments so that these young patients, suspected of being poisoned, can be carefully assessed and responsibly observed for an hour or two, rather than being subjected to what all too frequently becomes a ritual admission.

Foreboding toxicology

Now I turn to what I choose to call ‘foreboding toxicology.’ This is distinct from acute poisoning, in which one noxious stimulus impinges upon the organism and leads directly to a characteristic, adverse reaction. Instead, in chronic poisoning, repeated and ongoing insults from a toxin give rise eventually to debilitation, or even to death. The classical examples of this are seen with mercury, lead and arsenic. More commonplace, though, may be the liver cirrhosis and mental derangements that are entwined with prolonged, over-indulgence in alcohol. Worse still, especially in the public mind, is the cancer that may make its appearance 10 to even 30 years after contact with some organic dyes, asbestos, vinyl chloride monomer and, of course, cigarette smoking. The fears so engendered have been intensified by the zeal of the animal experimenters who, at the behest of governmental authorities, have demonstrated in tests on rats and mice, surfeited with enormous doses of the compound under examination, that literally hundreds of chemicals can be labelled as carcinogenic. These findings have coincided with a colossal world-wide expansion of the synthetic chemical industry. The impression has naturally formed that the permeation of these substances throughout the ecosystem disposes the population, involuntarily and largely unwittingly, to progressive and untreatable diseases. Food additives, pesticides and their residues, building materials, household products, toiletries, cosmetics, motor vehicle exhausts, factory effluents and wastes and practically everything with which we might come into contact have been indiscriminately inculcated in this way. The media have found this a fertile soil in which to cultivate their sensational and frequently ill-informed messages. Enthusiastically joining this campaign have been articulate reactionary groups and publicists insisting on what they ordain to be ‘natural foods’ and the withdrawal of all pesticides and food additives, a drastic contraction, if not total abandonment, of the synthetic chemical industry and a return to the erstwhile unsophisticated mode of life.

Before we capitulate completely to these pressures we might ponder the practical consequences. Life a century or more ago was, except for the relatively few members of the rich and privileged classes, cruelly inclement, and the daily round was one of unrelenting drudgery [12,13]. Housing conditions were appalling, sanitation was primitive or non-existent, clothing could be wretched, food supplies insufficient and uncertain, disease rampant, labour commonly excruciating and life short. As the cynics have remarked, a well-nigh unendurable existence was mollified only by the prospect of Elysium hereafter.

Sir Richard Doll, in his Harveian Oration of 1982, demonstrated the dramatic increase in life expectancy over the past century [14]. It is also relevant to note that, far from an epidemic of cancer descending upon us at the present time, the total age-weighted incidence of this disease remains more or less stationary.

How many, and to what extent, these changes in our survival and the relief afforded us from our daily burdens can be credited to the burgeoning of technology may be arguable. Nevertheless, it is inconceivable that our current standards of living could be maintained if the operations of our industries were to be drastically curtailed.

Ideally, people should be allowed to choose their own options. There is, however, little scope for two such disparate aspirations within the relatively small geographical compass of Britain and its correspondingly dense population. Some compromise, therefore, has to be pursued.

Control of environmental toxicity

Not for one moment do I contend that the misgivings about environment and personal exposure to pollution are entirely groundless. Avoidance of the ‘smog’s that previously engulfed our cities has brought about a marked diminution in the chronic obstructive lung disease which was previously so prevalent. Instead, I am arguing for a more rational and objective evaluation of the risks to be balanced against the benefits. Among numerous bodies grappling with this problem have been, in this country, the Royal Society with its study group in 1983 [15] and the Royal Society of Medicine, London, which staged a conference in 1984 on ‘The Chemical Industry and the Health of the Community’ [16]. Yet the dilemmas and disputes remain. So far as chemicals are concerned, the procedures generally followed by way of adjudication might helpfully be outlined here.

This being, fundamentally, an issue of poisoning, the principles of toxicology must be respected. First, the intrinsic toxicity of the substance has to be ascertained. Since direct experiments on man are vetoed, the only alternative, for the time being, is to resort to animals, primarily mammals and, foremost, rats and mice. Conventionally, a ‘toxicity profile’ is constructed. First, there are acute tests, with single doses. Then there are chronic tests, covering a few months to the whole life span of the creatures, using different routes of administration. In addition, the extenuated tests may be elaborated expressly to reveal carcinogenicity. Further laboratory explorations may be directed towards effects on reproduction, teratogenicity, neurological and behavioural responses, nephrotoxicity and a battery of other possibilities. Today, moreover, it is customary to probe into mutagenicity and genotoxicity, utilising an assortment of lower species, including bacteria. High doses are deliberately selected, with the object of provoking manifest adverse reactions. Commensurate with this time-consuming and expensive sacrifice of so many animals is the compilation of nothing less than an unwieldy corpus of toxicity data. All of this
induces the comfort of a high premium insurance and a sense of 'leaving no stone unturned.'

But then there is the perplexity of interpreting this immense volume of information and its extrapolation to the everyday situation, making due allowance for all the anomalies between species, the artificiality of the experimental conditions and the incongruity of the doses. It is naive to pretend that substances can be neatly divided into those that are toxic and those that are innocuous. So much depends, as Paracelsus pointed out more than 400 years ago, upon the dose and the circumstances. An appraisal must, therefore, be made of the manufacture of the compound, its intended usage, its possible dissemination in the environment and the form and extent to which man, along with other living organisms, is likely to be exposed to it.

To assimilate and reconcile all of these factors, regulatory authorities have come to rely on committees of selected and independent specialists. But the cry goes up, 'this is too important to leave to the experts'. Equally, I submit it is too treacherous an undertaking to commit to the vox populi, while it would be even more catastrophic to surrender to the media.

Collaterally, there has been a novel exploitation of analytical chemistry. The operators in this field are now so skilled and their equipment so refined that they are capable of finding a variety of strange and exotic substances in food, soil, the atmosphere and elsewhere, in incredibly miniscule amounts. Mere presence soon becomes confused with pathogenicity. The physician thereupon finds himself diverted from his orthodox philosophy of giving priority to the illnesses that he observes besetting mankind. Instead he is urged to pursue a legion of exotic chemicals each in search of a disease.

Again in his Harveian Oration, Doll insisted that 'new ways need to be found for providing government with authoritative scientific opinion.' The problem then is to decide just how. I would comment only that:

1. I can see no reliable alternative at all to relying on experts to grapple with these erudite questions.
2. At the same time I am conscious of the weakness of the committee structure. It can easily be dominated by a powerful, or intransigent, personality. The urge of a group is always towards rejection or, anyway, to procrastinate. The courage required to confer approval is seldom forthcoming.
3. In the course of committee discussions, I have frequently noted that what are recognised in our courts of law as the rules of evidence are blatantly disregarded. That is why I favour the chairmanship being entrusted to a trained and experienced jurist, however inexpert otherwise. Whether, however, such an argument on my part can be supported by those who serve on committees of the Law Society, or the Bar Council, I have yet to discover.
4. In some measure I veer towards the model of the public enquiry, although I would definitely exclude the participation of professional advocates.
5. So long as freedom of expression is accepted I can see no possibility of curbing the excesses of the media, however inimical these may be to rational decision-making. The Press Council is manifestly edentulous. Nevertheless, if journalists seriously pretend to be members of a profession, it seems to me that they should formally incorporate themselves, set their own respectable standards for accuracy and objectivity, to which their adherence should be ensured by effective internal discipline.

6. In this connection the undaunted zeal and vanity of some of our medical and scientific colleagues to parade themselves via the media publicly as experts on some or other toxicity theme might better be discouraged.

7. More fundamentally, I am unnerved by the enormous expansion over recent years in the subject of toxicology and the power that it has consequently come to wield. A whole race of specialist biologists has come into being, preoccupied exclusively with adverse effects, notably from chemicals. As with the police, embroiled day after day with crime, they must sooner or later feel that nothing good, or safe, remains in their world. Yet, as any practising doctor realises, the human body has a remarkable capacity for accommodating to a wide range of physical insults. The time is overdue for toxicology to become the handmaiden and not the goveness to any medical policy-making for health and safety.

Whatever proposals I might tentatively advance, I remain convinced that my 'foreboding toxicology' is outstandingly an expression of poisoning as a social phenomenon. If, therefore, we are to heed Dr Milroy's injunctions for promoting social welfare, I feel that the medical profession should take a more purposeful, more scientific and more responsible role in this regard.

References
1. Anon. (1900) Practitioner, 65, 171; 297; 568.
2. Smith, S. (1952) Medico-Legal Journal, 20, 153.
3. Ossius, T. G. (1957) University of Michigan Medical Bulletin, 101, 148.
4. Goulding, R. (1967) Journal of the Royal College of Surgeons of Ireland, 3, 13.
5. Fayol, (1930) La Vie et l'Oeuvre d'Osfil. Paris: Les Vies Authentiques.
6. Taylor, A. S. (1844) Bristol and Forensic Medical Review, London, 18, 333.
7. Ministry of Health (1961) H.M. (61) 64.
8. Kessel, N. (1965) British Medical Journal, 2, 1265; 1336.
9. Gardner, R., Hanka, R., O'Brien, V. C., Page, A. G. F. and Rees, R. (1977) British Medical Journal, 2, 1567.
10. Mills, I. H., and Eden, M. A. M. (1976) In: Man in Urban Environments. Oxford: Oxford University Press.
11. Vale, J. A. and Meredith, T. J. (1987) In Practical Paediatric Therapeutics. In Press.
12. Hammond J. L. and Hammond, B. (1917) The town labourer, 1760-1832. London: Longmans Green.
13. Hammond J. L. and Hammond, B. (1920) The village labourer, 1760-1832. London: Longmans Green.
14. Doll, R. (1982) Prospects for prevention. The Harveian Oration. London: Royal College of Physicians.
15. Warner, F. S. (ed) (1983) Risk assessment: report by a study group. London: Royal Society.
16. Roe, F. J. E. (ed) (1985) 'The chemical industry and the health of the community. London: Royal Society of Medicine.