AN EMINENT LIMERICK DOCTOR

INTRODUCTION

William Brooke O'Shaughnessy was born in Limerick in 1809, son of Daniel O'Shaughnessy. His mother's maiden name was Boswell. He studied medicine at Edinburgh, attending the classes of Robert Knox, who at the time was being supplied with cadavers by the notorious Burke and Hare. O'Shaughnessy graduated MD in 1829, and soon afterwards took a particular interest in chemistry and toxicology. The following year he moved to London.

In August, 1833, he was appointed assistant surgeon in the Bengal Medical Service, becoming surgeon in 1848 and surgeon-major in 1861, and was also professor of chemistry at the Medical College, Calcutta. He wrote many books on different aspects of medicine, including a ***Manual of Chemistry*** (published in 1841, one of the earliest comprehensive accounts of biochemistry, clearly demonstrating his vast knowledge of the subject), ***The Bengal Dispensatory*** and ***The Bengal Pharmacopoeia.*** He was elected a fellow of the Royal Society in March, 1843.

During his early years in India, he explored the potential therapeutic effects of Indian hemp or cannabis, experimenting on mice, rabbits and rats, as well as on some of his patients. The dramatic results were first published in 1842 in the ***Transactions of the Medical and Psychiatric Society of California,*** and included this description of its effects on a man suffering from rheumatism:

> *The fourth case of trial was an old muscular Cooly, a rheumatic malingerer, and to him half a grain of hemp resin was given in a little spirit. The first day's report will suffice for all: In two hours the old gentleman became talkative and musical, told several stories, and sang songs to a circle of highly delighted auditors; ate the dinners of two persons subscribed for him in the ward; sought also for other luxuries we can scarcely venture to allude to, and finally fell soundly asleep ...*

Cannabis was unknown as a drug in Europe and North America at the time. O'Shaughnessy's results generated considerable interest, and within a few years it was being used by doctors to treat a wide range of conditions. The enthusiasm lasted a long time, and it was not until 1932 that cannabis was deleted from the British Pharmacopoeia.

During his lifetime, O'Shaughnessy became famous less for his medical contributions than as the man who first introduced the telegraph to India. He had published a pamphlet in 1839 on the results of experiments with the telegraph, but got little official encouragement until 1847, when he was employed to lay an experimental line and report on the result. The experiment was successful, and in 1852 he was appointed Director-General of Telegraphs of India with instructions to begin the laying of lines connecting all the major cities of India. By February, 1855, the telegraph extended 3050 miles, connecting Calcutta directly with Agra, Bombay and Madras, achieved by O'Shaughnessy despite the unavailability of trained workmen, the absence of bridges over wide rivers and the lack of roads through dense jungles.

O'Shaughnessy was married three times. On retiring to England in 1861, he changed his name by royal license to William O'Shaughnessy Brooke. He died in his eightieth year at Southsea on 10 January, 1889. In 1973, when summing up O'Shaughnessy's achievements, Professor Brian McNicholl wrote:

> *This remarkable Irishman, who showed a largely unprepared world how to base rational treatment on valid scientific observation and analysis one hundred and forty one years ago, surely deserves a high place amongst the pioneers of medicine.*

The information in this Introduction is based on the chapter, "William Brooke O'Shaughnessy 1809-1899", in the book ***Masters of Medicine.***

DR. WILLIAM BROOKE O'SHAUGHNESSY

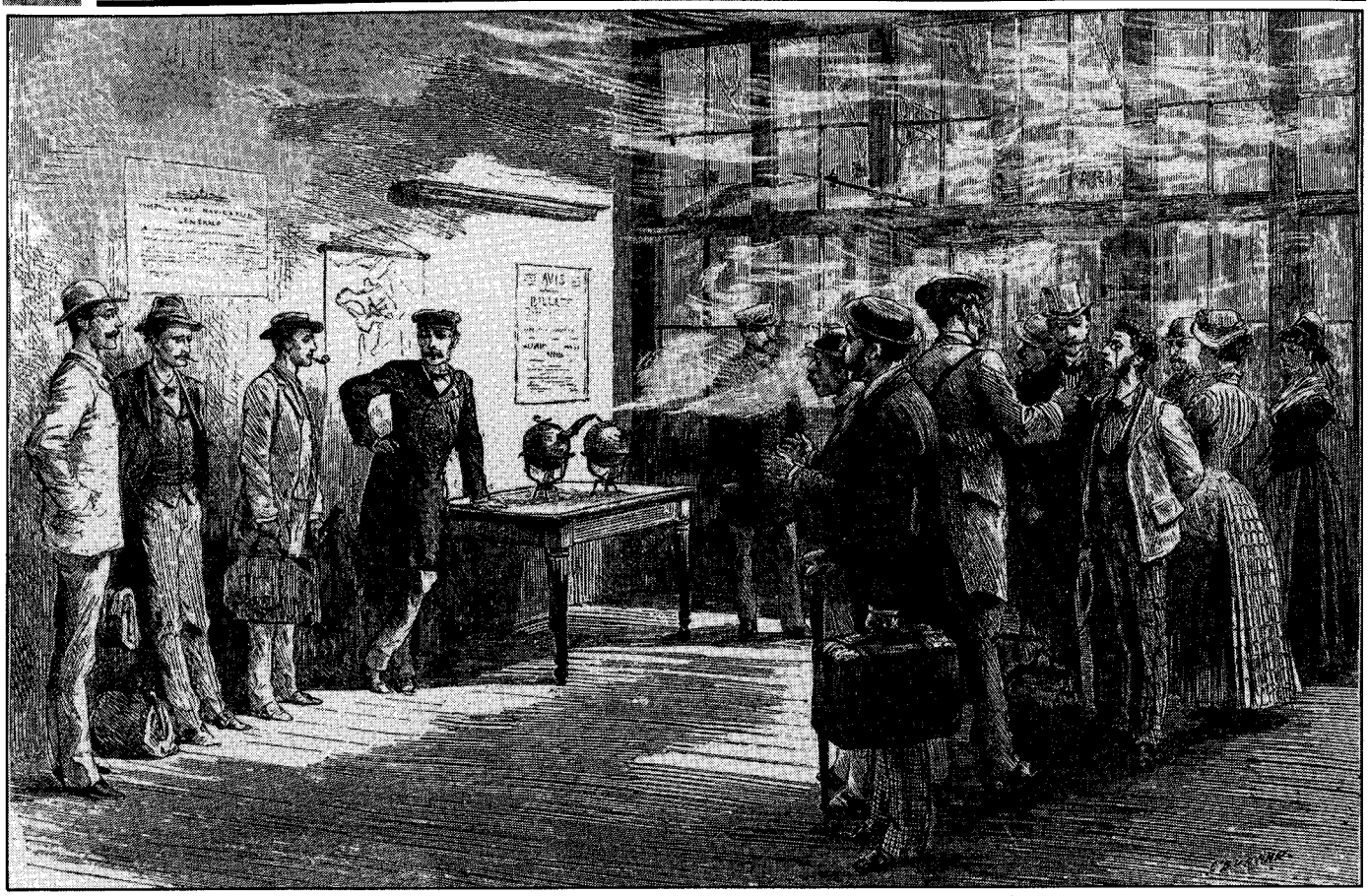
BY J.E. COSNETT

The scene is Britain in 1831. Princess Victoria is 12 years old; Florence Nightingale is 8, and Joseph Lister 4. The Anatomy Act, designed to regulate human dissection, is in the throes of debate. Anaesthesia for surgery is 15 years away. An outbreak of cholera, the second pandemic, is spreading across Asia and Europe from India, where it began in 1829. England watches its inexorable progress with horror and panic. A Central Board of Health issues advice on "Preliminary steps to be taken on the first appearance of cholera". The first recognised cholera patient dies in Sunderland on 26 October, 1831. There is soon no doubt that the epidemic has arrived, with its nidus in Sunderland.

MEDICAL BACKGROUND

In the medical arena chaos, confusion, and controversy fed on ignorance and superstition. Few British physicians had ever seen the disease. There were no specific diagnostic tests. There was doubt whether the disease was true Asiatic or "blue" cholera, or whether it was the less severe "English" cholera which had prevailed for years. Regarding cause, doctors were in two camps – the contagionists and those who believed in a non-infectious origin. "Cholera-phobia" was common, even among doctors. A ***Lancet*** correspondent "witnessed many a contagionist medical man feeling the skin and pulse of the patient with gloves on his hands, a handkerchief over his mouth, and a scent bottle at his nose, and stopping as short a time as possible ..." All manner of physical, chemical and biological influences were blamed. In an extensive review ***The Lancet*** concluded, with some accuracy, that "we can only suppose the existence of a poison which progresses independently of the wind, of the soil, of all conditions of the air and of the barrier of the sea; in short ***one that makes mankind the chief agent of its dissemination"*** [original emphasis] and that "the poison is regenerated in great quantities by those who suffer its influence".

Because of the constant observation of "black, thick, cold blood" in collapsed cases, it was believed that the cure must lie in the removal of this grumous blood from the patient. Of the three predominant modes of treatment the most



Carbolic acid fumigation of railway passengers against cholera.

universal was blood-letting. An authority wrote: "In commencing the treatment of cholera, no time is to be lost in endeavouring to bleed the patient ... the effect of blood-letting would appear to be almost miraculous ...". Of the other treatments, emesis was aimed at ridding the body of poisons, and vomiting was considered "the best of restoratives for torpidity of the blood". Calomel was almost universally used, as a means of "unlocking the secretions". Other treatments included a large fraction of the pharmacopoeia of the time, mostly based on empiricism and superstition. ***The Lancet*** viewed this therapeutic miscellany with some scepticism when it declared. "All have their seasons of celebrity and subsequent neglect".

GLIMMERINGS OF SCIENCE

A few doctors showed an inkling of scientific understanding. One thought that loss of water from the blood rendered it "difficult to circulation" and proposed that "distilled water be liberally poured into the stomach". Dr. Clanny of Sunderland analysed the blood of cholera patients and began his report with: "This blood, on applying the tongue to it, had no taste nor any particular smell ...". He found that the amount of water was decreased and the "colouring matter" increased, but he gave no specific advice about a remedy.

In clear contrast to the ignorance, superstition, and empiricism that largely prevailed, one voice was heard, almost alone with its tone of reason and science. This was Dr. William Brooke O'Shaughnessy, a recent Edinburgh graduate, ***born in Limerick and aged 22 years*** at this time.[1] In his first paper on cholera, read before the Westminster Medical Society on 3 December, 1831, he wondered whether "the habit of practical chemistry which I have occasionally pursued might lead to the application of chemistry to its cure". So engrossed was he in the cause and cure of cholera that he travelled to Sunderland a few days later, "for the purpose of making myself practically acquainted with the celebrated disease". Within 3 days he was writing to ***The Lancet:*** "I have lost no time in endeavouring to obtain conviction on some points, and evidence on others ...". He reported the appearance of two patients – clinical descriptions of cholera that have probably never been bettered:

> *"On the bed lay an expiring woman ... presenting an attitude of death which ... I never saw paralleled in terror ... On the floor, extended on a palliasse ... lay a girl of slender make and juvenile height, but with the face of a superannuated hag. She uttered no moan, gave expression of no pain, but she languidly flung herself from side to side ... The colour of her countenance was that of lead – a silver blue, ghastly tint; her eyes were sunk deep into the sockets, as though they had been driven an inch behind their natural position; her mouth was squared; her features flattened; her eyelids black; her fingers shrunk, bent, and inky in their hue. All pulse was gone at the wrist, and a tenacious sweat moistened her bosom. In short, Sir, that face and form I can never forget, were I to live beyond the period of man's natural age".*

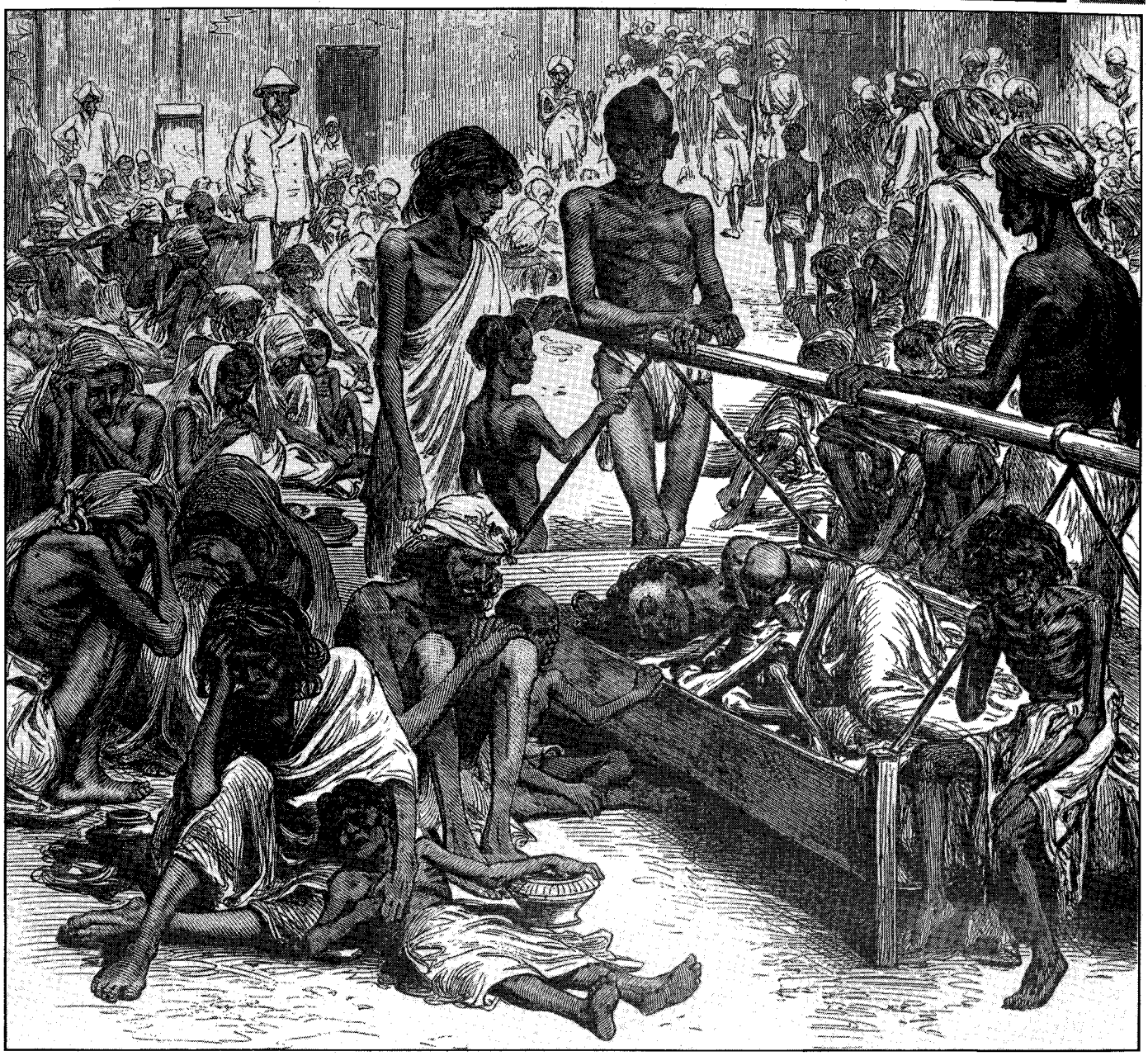
O'Shaughnessy used this description to support his view that the cholera in Sunderland was a different disease from that which occurred in England before: "Would to God I could bring the sceptics here and show them the girl ...". In half-answer to his prayer ***The Lancet*** of 4 February, 1832, had a full-page, 3-colour sketch of such a patient (figure) – surely a landmark in medical illustration.

On 20 December, 1831, O'Shaughnessy wrote: "I have been so busily confined in my laboratory that I have had little time for additional enquiries". Nine days later he wrote from London, asking ***The Lancet*** to publish the "outlines" of his results, as follows:

> *"The blood drawn in the worst cases ... is unchanged in its anatomical or globular structure ... It has lost a large proportion of its water ... It has lost also a great proportion of its neutral saline ingredients ... Of the free alkali contained in healthy serum, not a particle is present ... Urea exists in those cases where suppression of urine has been a marked symptom ... All the salts deficient in the blood, especially the carbonate of soda, are present in large quantities in the peculiar white dejected matters".*

These observations can hardly be faulted 150 years later.

All the while the disease was spreading through England and Scotland,



Famine in India in the 1870s.

appearing in London in January, 1832. There were reports of the "terrified populace" and the "dreadful distress which prevails in the neighbourhood of the various cases". O'Shaughnessy made a further, more detailed, report to the Central Board of Health, in which he confirmed his previous findings. Further he reported on the chemistry of the excreta and found that "the ingredients deficient in the blood were detected in the dejections or in other words, *the addition of the dejection to the blood, in due proportion, would have restored the latter to its normal constitution*" [original emphasis]. He stressed that the changes "should not be regarded as primary *causes*" but rather as the "*result* of an external impression ... we still remain in darkness as to the mode in which that impression is communicated ...". Pursuing his theme logically to the "therapeutic conclusions", he wrote:

> *"... the indications of cure ... are two in number – viz. 1st to restore the blood to its natural specific gravity; 2nd to restore its deficient saline matters ... The first of these can only be effected by absorption, by imbibition, or by the injection of aqueous fluid into the veins. The same remarks, with sufficiently obvious modifications, apply to the second ... When absorption is entirely suspended ... in those desperate cases ... the author recommends the injection into the veins of tepid water holding a solution of the normal salts of the blood".*

In his final remarks O'Shaughnessy wrote:

> *"I am therefore entitled to conclude that the exudation of the colourless part of the blood constitutes one of the chief diagnostic characteristics of the malignant cholera ... in the fluidity, alkalesence and albuminous nature of the dejections we have the means of forming a certain and chemical diagnosis between this disease and others with which ... it may be confounded".*

THE FIRST INTRAVENOUS INFUSION

The first practical application of O'Shaughnessy's advice was reported by Dr. Robert Lewins, MD, FRCP, of Leith in a letter dated, 15 May, 1832. He described witnessing the intravenous injection of a saline solution in a cholera patient. He wrote:

> *"To Dr. Thomas Latta, of this place, is due the merit of first having recourse to this practice. He has tried it in six cases ... The most wonderful and satisfactory effect is the immediate result of the injection ... a large quantity must be injected, from 5 to 10 lbs. in an adult, and repeated at longer or shorter intervals as the state of the pulse and other symptoms may indicate".*

A more detailed and formal report was sent by Dr. Latta to the Central Board of Health, and published in ***The Lancet*** of 2

June, 1832. He wrote: "So soon as I learnt the result of Dr. O'Shaughnessy's analysis I attempted to restore the blood to its natural state ...". The first patient was an aged woman on whom all the usual remedies had been tried without success:

> *"She had apparently reached the last moment of her earthly existence, and now nothing could injure her – indeed so entirely was she reduced that I feared I would not be able to get my apparatus ready ere she expired. Having inserted a tube into the basilic vein, cautiously – anxiously, I watched the effects; ounce after ounce was injected but no visible change was produced. Still persevering, I thought she began to breathe less laboriously, soon the sharpened features, and sunken eye, and fallen jaw, pale and cold, bearing the manifest impress of death's signet, began to glow with returning animation; the pulse, which had long ceased, returned to the wrist' at first small and quick, by degrees it became more and more distinct, fuller, slower and firmer, and in the short space of half an hour, when six pints had been injected, she expressed in a firm voice that she was free from all uneasiness, actually became jocular, and fancied all she needed was a little sleep; her extremities were warm, and every feature bore the aspect of comfort and health. This being my first case, I fancied my patient secure, and from my great need of a little repose, left her in charge of the hospital surgeon; but I had not been long gone, ere the vomiting and purging recurring, soon reduced her to her former state of disability ... and she sunk in five and a half hours after I had left her ... I have no doubt the case would have issued in complete reaction, had the remedy, which had already produced such effect, been repeated.*

Dr. Latta prepared the intravenous fluid as follows: "I dissolved from two to three drachms of muriate of soda and two scruples of the subcarbonate of soda in six pints of water, and injected it at temperature 112° Fah". (This is approximately 58 meq/1 sodium; 49 meq/1 chloride; 9 meq/1 bicarbonate.[1]) Latta emphasised that "the watery diarrhoea may return with violence ... therefore so soon as the pulse fails, and the features again shrink, the venous injections must be repeated ... The injection should be carried on very slowly ... it should not exceed 2 or 3 ounces per minute". He described the apparatus as "a small silver tube" attached by a flexible tube to "Read's patent syringe". He cautioned against accidental injection of air, and advised that phlebitis could be prevented by "treating the vein with much delicacy". In subsequent letters Latta and several colleagues from Leith described further cases, some with dramatic response to injections. In reply to a query from the Board of Health, Lewins admitted that ten of the fifteen who had been injected died, but "under such circumstances that do not detract from the general merits of the practice".

While O'Shaughnessy did not personally treat patients, he wrote to ***The Lancet:***

> *"... the results of the practice described by Drs. Latta and Lewins exceed my most sanguine expectations. When we consider that no practitioner would dare to try so novel an experiment, except in cases beyond hope of relief by an ordinary mode of treatment, and consequently desperate to the last degree, even a solitary instance of recovery affords matter for congratulation".*

He emphasised that "although by the injection of water and salts ... we may restore the deficient fluids of the body, and bring back the blood to its normal state, ... we must still remember that the unknown remote cause, and other agents, ... still are in operation, and require to be remedied before a perfect cure can be performed". ***The Lancet*** of 2 June, 1832, carried a leading article in which the history of intravenous injections was reviewed. The intravenous saline treatment of a cholera patient was described as "more like the workings of a miraculous and supernatural agent ...". It seems there was no previous record of water and salts being given deliberately to restore constituents lacking in the blood, though there is record of blood transfusion, and of the injection of 6 ounces of water into a Russian cholera patient, with death in 2 hours. Over the ensuing months there was a flurry of reports of cases treated with intravenous saline in Britain. Almost all reported dramatic, but often temporary, improvement, but relapse was frequent as the purging continued. Various modifications of the intravenous fluid were tried, even "milk, boiled once, skimmed and strained". Some patients were reported to have rigors or laboured respiration after the saline injections. Of the first 25 reported cases so treated, 8 recovered. There was much severe criticism, often outside medical journals. This provoked Dr. Latta to defend his treatment against "members of the medical profession guilty of scribbling on medical matters in the news-papers of the day".

THE TREATMENT FAILS TO PROSPER

This pandemic subsided in Britain during 1832 but it continued across America. Despite further pandemics in 1852 and 1863 the use of intravenous saline was not accepted. Why did the treatment not prosper when it had the foundations of rational therapy, supported by many reports of its successful application? Firstly, it was only applied in patients who were deemed moribund; so, while the proponents were satisfied that lives were saved, others, and the public, thought that deaths were hastened by the treatment. Not realising that severely dehydrated patients can no longer lose fluid, it was felt by some that rehydration provoked more purging. Secondly, the treatment was not repeated sufficiently to maintain fluid balance. Thirdly, the fluid was not only unsterile but also chemically impure and very hypotonic. So, the more fluid that was given, even with good intentions, the greater was the chance of bacteraemia, pyrogen reactions, and haemolysis. However sound the rationale, the idea was much ahead of contemporary knowledge of physiological chemistry and microbiology. Another reason for lack of persistence with the concept was that, after the epidemic subsided in Britain, the main protagonists were no longer on the scene when the disease struck again.[2] Latta died in 1833. In that year, O'Shaughnessy joined the East India Company and went to India. There he interested himself, not with cholera, but with chemistry, electricity, and telegraphy.[3] He was knighted in 1856, not for work in medicine, but for establishing a telegraph service between the main centres of India which was said to have influenced the result of the Indian mutiny.[4] William O'Shaughnessy's third claim to fame was that, on returning from India, he introduced cannabis to England and Europe as a potent medication and analgesic for the treatment of tetanus, rheumatism, and epilepsy.[5] He died in 1889, but obituary notices make no mention of his pioneering research[6] – his analyses of the blood and excreta of cholera patients, his deduction of the mechanism of the changes in composition, and his proposal of rational treatment, which was put into practice by Thomas Latta and Robert Lewins of Leith. All this when O'Shaughnessy was 22 and 23 years old, and when chemical pathology was an embryonic science. Dr. Lewins, in reporting Latta's second case, wrote to ***The Lancet*** on 18 May, 1832: "Verily, Sir, this is an astonishing method of medication, and I predict will lead to wonderful changes and improvements in the practice of medicine". He was right. Yet the names of O'Shaughnessy, Latta, and Lewins cannot be found in any major work on general medical history.

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