Frederick Pavy (1829–1911)—
the last of the physician chemists

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Frederick William Pavy was born in 1829, the son of a French maltster who came to England shortly before the birth of his son [1]. His father died within 2 years and Pavy was sent to a prep school near Swindon, from where he ran away twice, something his colleague and obituarist Frederick Taylor (1847–1920) regarded as evidence of independence of character [2]. From 1840 to 1843 he was educated at Merchant Taylors’ School. It seems that he worked in the office of a City firm between leaving school and 1847, when he entered Guy's Hospital. In 1852 he graduated from London University with the Gold Medal for Medicine. In the summer of 1852 he spent 3 months in Paris in the laboratory of Claude Bernard. His fellow students were George Harley and John Scott Burdon-Sanderson who, with Pavy, dominated the teaching of physiology in London on their return. They were treated as research students; Pavy worked on blood sugar measurement and Burdon-Sanderson on pancreatic secretion [3]. In 1854 Pavy became Lecturer on Anatomy at Guy’s and in 1856 Lecturer on Comparative Anatomy, Physiology and Microscopical Anatomy, a post he held until 1864. In 1858 he was elected Assistant Physician, in 1863 FRS and in 1871 full Physician at Guy’s.

London teaching hospital physicians of this era were marked out from the rank and file of ordinary doctors and often became very wealthy because of their connections with the prestigious lay governors of the hospital and the private practice this spawned. They had a high sense of their own importance and many, like Pavy, were impetuous in defending themselves and their theories even if this meant, as it usually did, criticizing colleagues [4]. Typical English consultants were not, as in Germany and France, scientific researchers. For example, Pavy’s contemporary Sir Hermann Weber (1823–1918) published hardly anything but counted among his patients five prime ministers and many of his most distinguished colleagues [5]. Physicians who did publish, such as Sir William Gull (1816–1890), Pavy’s colleague at Guy’s, concentrated on general clinical observation and the natural history of disease; Gull gave the first clinical descriptions of anorexia nervosa and myxoedema [6]. In contrast, Pavy was an indefatigable experimenter and, certainly in the earlier part of his career, regarded himself as a physiologist. In his 1862 Gulstonian Lectures he lamented that ‘The science of physiology still remains in its early age. Unfortunately, also, for the science of physiology, it is almost exclusively upon those engaged in the practice of an arduous profession that the labour is thrown of contributing to its advance. It is undeniably a drawback for physiology that there are not greater facilities offered, or a greater encouragement given towards prosecuting its researches. It may be said—certainly in our own country—that scraps of time stolen from a busy professional life, often at considerable pecuniary sacrifice, form the only source for promoting its advance’ [7].

Pavy gave lectures on physiology to medical students from 1856 to 1877 and these were a source of considerable mirth and rowdiness because he ‘lacked the sternness of character which compels obedience in class’ [8]. His manner was pedantic; he referred to an animal’s mouth as its ‘oral orifice’ and delivered lines such as ‘Our assistant will now proceed to agitate the liquid’. What saved the day was his live demonstrations of vivisection, which were so slick that many thought he would have made a wonderful surgeon. He was one of 19 founder members of the Physiological Society in 1876, and in an encomium on his 80th birthday the Lancet described him as ‘One of the best known and most learned of our physicians and physiologists, who despite the weight of years maintains himself in the van of our ranks and fights for truth as keen and vigorous a battle now as ever he did when he was winning his spurs over 50 years ago’ [9]. An obituary in the Guy’s Hospital Gazette described him as ‘a very self-contained man whom no-one knew well’ and ‘methodical, punctual and precise in all he did’ [10]; lest this seems unduly severe, one should note that his favourite relaxations were music and opera, and his dinner parties were famous for good food and wine. Colleagues like William Hale White, Frederick Taylor and Frederick Gowland Hopkins had great affection for him.

Pavy was a prolific writer and between his first paper in the Guy’s Hospital Reports in 1853 [11] and his last in the Journal of Physiology in the year of his death [12] he published at least 60 papers and 6 books. In the limited space available, I will confine myself to five issues which give a flavour of Pavy and his times.
Opposition to the glycogenic theory

Between 1843 and 1848 Claude Bernard (1813–1878) laid the foundations for our understanding of the physiology of glucose homeostasis with his discovery of the glycogenic function of the liver [13]. The crucial experiment was when he took a slice of liver immediately after death, plunged it in boiling water and got an opalescent liquid which gave no reaction for sugar; when he added saliva, the liquid cleared and gave a very strong reaction for sugar. Bernard’s hypothesis was that sugar absorbed from the intestine was converted into glycogen in the liver and then reconverted to replenish constantly the level of blood sugar during fasting. Pavy’s first paper in 1853 was a summary of what he had learned while working with Bernard. His second in 1855 was critical of the glycogenic theory [14] and from then to the end of his life he repeatedly published his vehement objections. The facts and arguments in his 1862 book On the nature and treatment of diabetes [15] are almost identical to those in Physiology of the carbohydrates in 1894 [16].

Pavy thought Bernard had been misled into inferring a physiological condition from postmortem findings—the experiment in which he put a slice of liver into boiling water. Bernard retorted that logic would demand that Pavy ‘consider the diabetic patient as a walking corpse’ [17]. On another occasion, when told that Pavy had criticised the liver-washing experiment as irrelevant to real life, he could only make the exasperated comment ‘This is harking back to old vitalistic notions’ [18]. In retrospect, the conclusions that Pavy drew were almost entirely wrong. Apart from his own obstinacy, two factors contributed. First, his scientific work was confined within the four walls of his laboratory at Guy’s and he read little of the current literature and hardly ever discussed his work with colleagues except when engaged in polemics [19]. Second was the grip of natural theology; Pavy found the idea that sugar would be changed into glycogen and then back again ‘improbable’ [20], because ‘it would not accord with what we should expect from the notion we possess of the manner in which the operations of nature are conducted’ [21]. An important plank in his reasoning was his finding, supported by the authority of Brücke and Bence-Jones, that normal urine always contained sugar, together with his conviction that the kidney was just a filter through which small molecules were bound to escape [22]. For him, sugar could not ‘exist to any notable extent in the blood without immediately being drawn on and separated by the kidneys, so as to become recognisably present in the urine’. If it were true that the liver was continuously pouring sugar into the general circulation then, said Pavy, ‘we should all be labouring under diabetes mellitus’ [23]. He insisted that, far from being a glucose-forming organ, the liver was a barrier to the entry of sugar into the general circulation. He thought liver glycogen was an intermediate stage between sugar and fat; since both were natural constituents of liver cells there was some logic to this, though no mechanism was suggested for the transformation and he produced no experimental evidence.

By the 1890s few subscribed to Pavy’s theory but, surprisingly, the first public challenge in Britain did not come until 1894 when the 35-year-old physiologist Noel Paton (1859–1928) wrote a highly critical review of the 65-year-old Pavy’s new book [24]. Paton claimed that Pavy’s method of measuring blood sugar was inaccurate, his theory that the liver was a sugar-destroying organ had little experimental support, and that Pavy had ignored the literature. Pavy responded with an epicriticism [25] and, after further criticism from Paton, a series of four articles in the British Medical Journal [26].

In 1908, aged 79, Pavy gave his last lecture on diabetes at the Royal College of Physicians [27]. He was still sure that sugar was present in normal urine in an amount proportional to the blood sugar level. It was therefore ‘inconceivable that sugar could exist in the blood without passing off with the water of the urine’. He described the renal threshold for glucose as ‘a pure fiction invented to escape from the difficulty arising from not finding sugar in the urine as an outcome of the imaginary flow of sugar into the circulation from the food and the liver’. Physiologists who supported the glycogenic doctrine, such as Schäfer, Foster and J J R Macleod, are castigated because their theory ‘has no practical application’. Furthermore, claimed Pavy, physiologists could afford to be complacent because their errors did not matter, whereas, for a clinician treating diabetes ‘the rightness or wrongness of the thesis upon which he is basing his procedure means everything’. One of the most eminent diabetes specialists in Europe, Professor Carl von Noorden of Vienna, was ridiculed for suggesting that ‘secondary over-production of sugar . . . plays an important part in diabetes’.

After 1900 Pavy’s explanation as to how small molecules such as glucose or amino acids got from the intestine to the tissues without being excreted by the kidney was that they were incorporated into lymphocytes in the intestinal villi. In lectures on physiology in 1905, Pavy spoke of the lymphocytes as multiplying in the villi ‘just as bacteria do upon a nutrient medium’ [23]. According to Pavy, when they reached their destination they discharged their burden and autolysed. Gowland Hopkins later calculated that it would require the generation of $2^{1/2}$ kg of lymphocytes to cope with one day’s food! [29].

Urine testing

The application of chemistry to medicine, and specifically to analysis of the urine, developed gradually during the first half of the 19th century. In 1821 William Prout (1785–1850), to whom Pavy referred
approvingly and jingoistically as 'our distinguished countryman Prout', published An inquiry into the nature and treatment of diabetes, calculus and the affections of the urinary organs [30], in which he described how to test for acidity with litmus, for protein by heat coagulation and for bile by the yellow staining of linen. Sugar was still recognised by taste and by observing the white patches where urine had spotted the clothing or shoes. In 1844 Golding Bird, Assistant Physician at Guy's Hospital, published his Urinary deposits, their diagnosis, pathology and therapeutical indications [31]. Around the time Pavy qualified, the need to test the urine to diagnose diabetes was superseded by chemical tests—Trommer's in 1841, Moore's in 1844 and Fehling's in 1849. Fehling's test was based on the ability of glucose to reduce cupric ion to cuprous ion in hot alkaline solution. In his 1860 Lettsomian Lectures [32] Pavy reviewed the various urine tests, ending with a recipe for what later became known as Pavy's ammoniated cupric test [33].

The competing claims of various urine tests for glucose and albumin led Pavy to two jousts with another pugnacious physician, George Johnson (1818–1896), Professor of Medicine at King's College Hospital [34]. The first began in 1882 when Johnson wrote to the Lancet suggesting that picric acid was an ideal test for albuminuria [35], and then 2 weeks later announced that while boiling diabetic urine with potassium hydroxide (Moore's test) he decided to add picric acid and 'in an instant the liquid assumed a deep purple, almost black colour’. The same happened with a second specimen and he concluded that he had found a new and very delicate test for glucose [36]. Pavy wrote a sarcastic and provocative letter, suggesting inter alia that a hypersensitive test for sugar would be a disaster when what was wanted 'for medicinal purposes is not to recognise the small fluctuating amount of sugar in healthy urine but sugar when it reaches an amount to be of clinical significance'. He ended by suggesting that the discovery 'which Dr Johnson has so hastily communicated to you will prove devoid of value' [37]. Between 9th December 1882 and 20th January 1883 a further salvo of letters followed and eventually degenerated into little more than a slanging match, so the editor closed the correspondence. This controversy was not a purely scientific one. Both protagonists were fashionable London consultants with large private practices. By 1894 Pavy had seen 2,642 diabetics in his rooms at 35 Grosvenor Street [38]. This was one way of jockeying for priority and keeping their names in front of the doctors on whom they relied for referrals. Also, both had a commercial interest in their tests and never missed an opportunity of telling readers where the apparatus or reagents could be obtained. Furthermore, the accuracy or otherwise of urine tests for glucose was crucially important for life insurance, an industry which in 1875 generated 100 million pounds sterling and was second only to the railway interests of the country [39].

In 1894 Johnson, now Sir George, Physician Extraordinary to the Queen, was involved in another protracted and acrimonious dispute with Pavy. In the Lancet of 7th July, Johnson claimed that over the previous 25 years he had seen many patients misdiagnosed as having diabetes just because their urine reduced Fehling's solution [40]. His explanation for these false positives was that uric acid and creatinine were reducing agents normally present in urine. Johnson's object had been to: 'Recapitulate the main facts by which it has been conclusively proved that no sugar exists in the normal secretion. I may add that by means of the picro-saccharometer any practitioner may with ease, in the course of a few minutes, make an accurate determination of the amount of sugar per ounce or per cent in a case of glycosuria'.

Again a quick-fire correspondence followed: a letter from Pavy on 14th July, a reply from Johnson on 21st July, a reply from Pavy on 28th July, a further letter from Johnson on 11th August and a final riposte from Pavy on 18th August [41]. Had Johnson wished to annoy Pavy he could not have chosen a better way than by a paper in January 1895 entitled The absence of sugar from normal urine proved by a new and very simple method [42]. Not only did this suggest that Pavy's modification of Fehling's test was unreliable but, if true, it disproved Pavy's claim that the kidney was freely permeable to sugar, one of the main planks in his opposition to the glycogenic theory. Again the correspondence degenerated into little more than personal abuse, and Johnson wrote 'It is to be regretted that a scientific discussion cannot be conducted without an unseemly display of personal feeling' [43].

Urine testing was an important part of Pavy's professional life. Taylor remembered that his consulting room was 'adorned with a beautiful fernery occupying the whole of the south side of the room, but the initiated knew that behind this was a lab in which an assistant was testing the urine while the patient was describing his woes to the physician' [44]. On his ward rounds at Guy's the sister always carried a tray of urine testing apparatus so that he could check the findings of his junior staff [45].

Pure physiology

In 1876 the renowned American long-distance walker Edward Weston (1839–1929) came to compete in the Agricultural Hall in London. Weston was the premier endurance athlete of his day and in 1867 had walked from Maine to Chicago (1,326 miles) in 26 days [46]. Between 8th February and 8th March 1876 he did three separate walks; in the first—an attempt to cover 115 miles in 24 consecutive hours—he failed, according to the Times because of his nervousness and the excessive smoking of the audience in the hall [47]. In the second he succeeded in walking 180 miles in 48
hours. His final challenge was 500 miles in 6 days in which he failed, covering only 450 miles because of a sore knee. During each of these feats of endurance Pavy and his assistants recorded everything he ate and analysed virtually every drop of urine he passed during and immediately after his walks [48]. Pavy recorded that ‘Mr Weston enters with as much enthusiasm into the spirit of these researches as into his walk, and has placed every facility at my disposal. It is only a just tribute to him to say that science is indebted to him for his desire to aid its advance’. The Lancet had mixed feelings about the walks, which ‘seem to us not to admit of defence from a practical or physiological point of view... Nevertheless Mr Weston shows the utmost willingness to be used as a means of determining what human muscles can do, and at what cost of damage to themselves this can be accomplished’ [49]. Pavy spent the summer analysing the data and presented his conclusions in a series of articles at the end of 1876 [50]. The issue was the correctness or otherwise of Liebig’s doctrine that the muscles oxidised (and hence destroyed) themselves to produce movement. If this were so, the excretion of urea would be proportional to the amount of exercise. This doctrine had been discredited, if not completely disproved, by Fick and Wislicensius who climbed a mountain on a non-nitrogenous diet and found that their urea excretion diminished. Ten years earlier a correspondent had put forward what he called the commonsense view that if the muscles were oxidised one would expect them to shrink, whereas it was obvious that the more people exercised the larger they became! [51]. Supporters of Liebig’s theory claimed that muscle was not only oxidised but constantly regenerated; this, as Pavy noted, would require a large amount of nitrogen in the diet. What he found was that Weston excreted more nitrogen on days of walking than on rest days, and that this could not be accounted for by an increase in nitrogen eaten. After some complex calculations (and a large number of assumptions), Pavy concluded that ‘the force obtainable from the nitrogenous matter disintegrated is totally inadequate to supply the power for the work performed’. Even allowing for a large margin of error in the calculations, Pavy considered it utterly impossible that the power of muscular action could be due to the oxidation of muscular tissue. Interestingly, the physiologist Austin Flint Jr had done similar experiments on Weston in America and come to the opposite conclusion! [52].

**Internal hospital politics: the Great Nursing Dispute 1879–1880**

What became known as the Great Nursing Dispute [53] began in October 1879 when, without consulting the medical staff, the treasurer of Guy’s, Edmund Lushington, appointed a new matron, Miss Margaret Burt. She had been trained at St John’s House, an organisation founded by a physician, Robert Bentley Todd (1809–1860), to ‘elevate the character of nurses, train them properly, and hold out the prospect of a better social position than they could otherwise hope to obtain’ [54]. There was a religious dimension to St John’s House but it was not a traditional religious community and, unlike High Church sisterhoods, did not call for vows of poverty or monastic obedience. In 1855 the sisterhood contracted to provide all the nursing at the newly rebuilt and enlarged King’s College Hospital and, in 1872 alone, turned down requests from 11 hospitals to take over their nursing. Nursing by the sisterhood was very efficient and expensive, and their assertion of a right to professional autonomy was bound to lead to conflicts. Miss Burt had decided views about the standard of nurses at Guy’s who, she claimed, were untrained, took money from patients, spent their free evenings in pubs and music halls, did not keep the patients clean, and wore jewellery. As part of their training she believed that nurses should rotate through different wards rather than, as at Guy’s, serving their whole career on one ward. Her changes, particularly the introduction of ‘lady pupils’ and the dismissal of some of the old sisters, infuriated the medical staff, whose first joint letter to the treasurer, dated 1st December 1879 (signed by all 20 physicians and surgeons), included statements such as: ‘Her acts seem to be totally subversive of the great principles which have always been in operation at Guy’s Hospital’; ‘Her object appears to be the establishment of a sisterhood to which everything is to be subservient’; ‘The matron has shown throughout such a want of knowledge and appreciation of the requirements of a large hospital like Guy’s, and her conduct towards those under her has been of such an overbearing character, that no harmony can possibly be expected’; and ‘We regard the present as a crisis in the history of the hospital’ [55]. Naturally, the medical staff sided with their sisters, and at one point the treasurer wrote: ‘The insubordination and insolent demeanour of several of the old sisters has been maintained and fostered by the support and encouragement they have received from the conduct of several members of the staff... They have made repeated acts of contumacy and disrespect’. On 10th December the sisters sent a petition to the president, treasurer and governors of Guy’s asking them to ‘take into consideration the serious state of this hospital, consequent on the appointment of the new matron. The regulations she has issued render it extremely difficult for us to carry on the work of our wards. The ungenerous treatment to which she has subjected the whole nursing staff has already resulted in the loss of more than 30 of our best nurses’ [56].

On 5th February, 1880 the medical staff set out their grievances in a long printed document which had 23 numbered paragraphs and included some trivia such as complaints about a change in the colour of counterpanes on the beds and confusion about the meaning
of the title ‘sister’ (the treasurer, in a memo to the
governors, described the latter as ‘really too pu-erile’) [57]. In addition to the internal memoranda to the
treasurer and governors, the medical staff also wrote
to medical journals (usually anonymously because of a
gagging order from the treasurer); in the British Med-ical Journal a ‘member of the staff’ complained that ‘at
Guy’s, we have no voice in the matter. The treasurer
is supreme; and if, as it seems, everything is placed in
the hands of the matron, we have become subordinate to
the treasurers’ [58].

In March 1880, the General Court of the Governors
convened 3 days of meetings to hear the views of the
doctors [59]. Pavy was the main spokesman, and
although his reputation for being ‘methodical and
precise’ stood him in good stead it annoyed the gov-
nors, as shown by exchanges on the first day, during
which the chairman expressed concern at the amount
of time that would be needed to probe into every
detail, believing that they ‘should not rake up any
more bygones which had better be forgotten’, while
Pavy insisted that, having made a detailed statement,
‘we should support all the points raised’ [60].

When the meeting reconvened a week later, the
chairman began with a request ‘not to be so discursive
as you were on the last occasion’, and suggesting that
‘some of the younger members of the staff may have
some information to give us, but if the time is entirely
taken up by others, we shall never get to an end’ [61].
Although Pavy agreed to comply, he continued in the
same discursive way, either being interrupted by (or
calling evidence from) his colleagues or interrupting
himself. When he read a letter from a patient docu-
menting the totally different atmosphere of the hospi-
tal in January 1880 compared with that during her
admission in August 1879, the chairman considered
this to be of no use as evidence (since it was hearsay),
to which Pavy replied that he did not ‘quite know what
constitutes evidence’ [62].

One complaint of the medical staff was that lady
pupils were told to spy on them, and Pavy read out
extracts from the diary of one, describing a ward
round on which he had raised the issue of turning
patients out of bed as early as 5am: ‘a rheumatic fever
patient of his had suffered a relapse through this
being done, and he forbade his patients to be dis-
tracted at that hour’, adding that it was ‘an evil, cruel
and pernicious thing, which ought not to be’ [63].

Despite the numerous examples of what Pavy called
the ‘harshness or coercion now existing’ at Guy’s the
chairman did not think that he had proved his point:
‘No doubt you have shown that a great number of the
nurses have given notice to leave the hospital, but I
think the description of the management of the hospi-
tal which you are now giving us, is an unfair one’. To
which Pavy could only reply finally: ‘No doubt she [the
matron] gives directions in a very grand way, and
although she is very plausible and agreeable to those
members of the hospital medical and surgical staff
with whom she is conversing in the ordinary way, still
that is not the manner of her dealing with those who
are placed under her control’ [64].

That the governors were not impressed by Pavy’s evi-
dence or that of the Senior Physician, Samuel Haber-
shon, which they regarded as petty and discursive,
seems understandable to an impartial observer read-
ing the 223 pages of transcript a century later. Some
parts do, however, have a contemporary ring. For
example, Walter Moxon complained that under the
new system he had to do his ward round with ‘a nurse
whom I never saw before, and she is only in profes-
sioned charge of twelve people because the other twelve
are in charge of somebody else’. This somebody else had
been sent out by the matron to take an airing! The
result was that Moxon had ‘heard a man say that his
bowels were opened five times, and yet the nurse does
not know anything about it’ [65]. In April 1880 the
temperature was raised further when the magazine
Nineteenth Century contained a long article by Margaret
Lonsdale, a lady pupil of Miss Burt, in which inter alia
she accused the honorary staff of Guy’s of preferring
their own lower class nurses to ladies such as herself,
because they were able to indulge in obscene language
before the patients without let or hindrance, the ‘old
style’ nurses allowed the students to come and exami-
nine the patients at any hour, and the staff could do
experiments on the patients which they dare not do in
the presence of a well trained lady nurse [66].
Margaret Lonsdale’s public challenge allowed the
medical staff to shed their anonymity. Sir William Gull
and Habershon replied in the May issue of Nineteenth
Century [67], and Moxon wrote a long article in the
Contemporary Review [68].

On 26th June the physicians wrote to the president
of the hospital (Mr Gladstone) stating their terms for
peace, which were: a return to the ward system;
removal of the matron; a committee to manage nurs-
ing with ‘adequate’ representation of the medical staff;
and that the treasurer should treat the staff with the
same confidence shown by his predecessors [69]. In
September the governors issued a warning that they
would take action against staff if the ‘struggle for
power’ continued, and on 7th October they issued a
printed ultimatum demanding the resignation of the
Senior Physician and Senior Surgeon [70].

In a long editorial on 16th October 1880 the British
Medical Journal felt that the dispute had been brought
about by ‘a lamentable want of judgement, faults of
temper and discretion on the part of the treasurer; by
a painful inefficiency, arising probably from excess of
zeal and defective administrative power, on the part of
the lady whom the treasurer selected to carry out
reforms in the nursing system; and by pardonable
irritation, incomplete harmony, and excessive letter-
writing on the part of the medical staff’ [71].

The Lancet felt that by not holding together, unlike
the little band at Rorke’s Drift [72], the physicians had
thrown away their advantage. Pavy defended himself

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and his colleagues against the charge of cowardice [73]. Instead of the previous situation where the treasurer was ‘our supreme ruler’, the matron would ‘submit herself obediently to the orders of the several physicians and surgeons in all matters directly affecting the treatment of any patient’. ‘Do we’, said Pavy, ‘deserve the hard words and insinuations you have so indiscriminately hurled upon us? We began with no recognised status in response to the nursing administration and we leave off with an official position upon a Committee of Governors. Such is the very machinery which has been put forward by the press as a model to be copied’.

The case of the cold bath

In the same year as the nursing dispute, and arising directly from it, Pavy became embroiled in a public quarrel with Sir William Gull which reflected badly on relations between the medical staff at Guy’s and provided unwelcome publicity. A 26-year-old woman was admitted under Pavy’s care in June 1880 with signs of phthisis at the apex of the left lung, vague pains in the abdomen and left leg, occasional nausea, headaches and spikes of temperature [74]. Pavy described her as ‘of a sensitive organisation’ and, because she had not become pregnant for 9 years, suggested to the students that ‘she might be reasonably looked on as hysterical’ [75]. Her condition deteriorated and, on 5th July after she had soiled her bed, she was forced by a nurse to walk to the bathroom, was put in cold water for 20 minutes and then left for a further hour. The patient’s husband complained to Pavy and, on Wednesday 7th July, he noted bruises and a marked change in her general condition. On 8th July the treasurer wrote to Pavy about the alleged ill treatment of the patient and Pavy replied at length on 9th July [76]. He concluded that she had been grossly ill treated by the nurse, that it was not simple neglect but ‘a designed act of punishment’, and that ‘the nursing system in operation was in part responsible for it—responsible by encouraging too much independence in the nurses of the authority of the sister and by fostering a spirit that duty should consist of obedience to hard and fast rules rather than consideration for the ever-varying wants of the patient dictated by pure kindness of heart’.

Pavy declined to meet the treasurer for a personal interview, citing the way he had treated other members of the staff. The patient died, and autopsy showed tuberculous meningitis and a large suppurating cyst in the pelvis which had opened into the rectum. At the inquest Nurse Ingle, a lady pupil introduced to Guy’s by Miss Burt, was committed for manslaughter [77]. Although he had not been subpoenaed, had never seen the patient and had not attended the postmortem, Sir William Gull appeared for the defence. The prosecution case was that the brain disease had been activated by the bath. The defence, based mainly on the authority of Gull, was that the patient had obvious brain disease which would have progressed rapidly in spite of the bath and, further, that if she had been suffering from hysteria a cold bath would have been the appropriate treatment. The barristers spent most of the trial vying with one another to convince the jury which witness was the more eminent. A particular problem was that there had been no clinical clerking between 9th and 23rd June, so the student had to ‘recreate a history for the earlier dates’. No one could answer the crucial question of whether or not she had had headaches. Gull asserted that the symptoms of brain disease were obvious before the bath, and that Pavy ‘ought to have diagnosed’ or should ‘certainly have suspected’ its existence. When asked in cross-examination whether the best judge of the state of the patient was the physician who saw her from day to day, Gull replied ‘Certainly, he ought to be’ and, on another occasion, ‘No doubt he ought to be’. Pavy was aggrieved because he claimed that emphasis on the word ‘ought’ suggested that what Gull was really saying was ‘He should be, but he [Pavy] was not’. A further point of contention was that Gull had, without Pavy’s knowledge, obtained the clinical notes from a registrar [78]. Pavy insisted that this was ‘only a student’s report’; to which Gull replied ‘The physician governs the clinical report. I was a physician at Guy’s for 20 years, and I always dictated the reports myself’. This was wishful thinking; Walter Moxon wrote to the British Medical journal saying that he had been Gull’s clerk for 5 months during which Gull never dictated a line [79]. On the question of whether the student’s report was the property of the physician, the Lancet commented: ‘It argues a surprisingly strange state of matters, that so simple a point as this should be involved in obscurity. Either there is a clinical record kept in each case, to which the governors may have access—although it is difficult to divine for what purpose the lay authorities of a hospital can need to refer to a medical and technical report—or the papers were the property of Dr Pavy alone’ [80].

The unfortunate Louisa Ingle was convicted of manslaughter and, given the contradictory nature of the evidence, it is difficult to decide how far she was a scapegoat and casualty of the bitter war between the medical staff and the governors, and of the professional disagreements between Gull and Pavy. It was clearly established that she did ask permission from the ward sister before giving the bath, her exact words being ‘Can I give No. 2 a bath?’ The Times was in no doubt that the fault lay with the governors who had tried to develop a system of nursing independent of and ‘almost in defiance of’ medical opinion. Louisa Ingle was sentenced to 3 months without the indignity of hard labour. The Lancet was critical of the defence, which it described as ‘singularly lame and impotent’ [80], and the BMJ was equally critical of Gull for his contention that the bath had no effect on the course of the disease. To the editorialist, it was obvious that
'sudden fluxion of blood to a chronically diseased organ, brought on by over-action of the organ (in this case over-excitement of the brain) is a most frequent cause of acute progress of the disease' [81]. Pavy was upset at what he described in a letter to the Times [82] as 'an unwarrantable slur on my competency' and reported Gull to the Censors Board of the Royal College of Physicians. The Lancet had a low opinion of the board who had 'on former occasions scarcely shown the wisdom, tact and independence which would entitle it to the implicit confidence of the profession at large' [83]. This was justified, because the eventual decision was a classic fudge in which both Pavy and Gull were exonerated.

Afterword

History is not kind to losers, and Pavy’s only tangible memorial is the gymnasium which he endowed at Guy’s Hospital [84]. Contemporaries doubtless recalled Sir William Gull’s satirical comment: ‘What sin has Pavy committed or his fathers before him that he should be condemned to spend his whole life searching for the cure of an incurable disease?’ [85]. In their epitaphs, even his supporters seem to damn with faint praise. Frederick Taylor wrote: ‘Pavy’s work is, perhaps, the most remarkable instance of steady persistence in one relatively limited line of inquiry, and illustrates not only the extraordinary tenacity of purpose of the inquirer, but also, and in no lesser degree the evasiveness and almost insolubility of some problems of life and disease’ [86].

The anonymous obituarist in the Guy’s Hospital Gazette, after noting enigmatically that ‘another branch of the old young tree has fallen off’, suggested: ‘If in the end he has put no coping stone to the edifice, has added no consummate discovery to the sum of the world’s knowledge . . . What matters it? Has he rendered less service to mankind? Emphatically no!’ [87].

As he aged, Pavy’s views became more polarised and inflexible. His combative spirit seems to have grown after the death of his wife in 1884, and it seems extraordinary how much space he was granted in medical journals to propound his increasingly idiosyncratic views and to attack his critics. Having begun by regarding himself as a physiologist, Pavy had, by the end of his life, decided that physiologists were dilettantes whose work had little relevance to the real world and in particular to the problem of diabetes.

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References and notes

1 Biographical details have been collated from the following: Frederick Taylor. In memoriam Frederick William Pavy MD, FRS, FRCP. Guy’s Hospital Reports 1912;661-24. Obituaries: Guy’s Hospital Gazette 1911;25:395-6; British Medical Journal 1911;i;777-8; Lancet 1911;i;976-80; Munk’s Roll: Lives of the Fellows of the Royal College of Physicians of London 4:132-3; Cameron HC. Mr Guy’s Hospital 1726-1948. London: Longmans, 1954:236-7.

2 Taylor was a Guy’s physician whose textbook of medicine led the field for over a quarter of a century; he became President of the Royal College of Physicians in 1915.

3 Olmsted JMD, Olmsted EH. Claude Bernard and the experimental method in medicine. London: Abelard Schumann, 1958:70.

4 M Jeanne Peterson. The medical professional in mid-Victorian London. London: University of California Press, 1978:16.

5 Munk’s Roll. 4:121-2.

6 Sir William Wilhey Gull (1816-1890) was the youngest of eight children of an Essex barge owner; he became one of the most successful and fashionable physicians of the time and at his death left £344,000. See: Sir William Hale White. Great doctors of the 19th century. London: Edward Arnold, 1954: 208-26; Obituary. Br Med J 1890:i;250-63.

7 Pavy FW. Gulstonian lectures on assimilation and the influence of its defects on the urine. Lancet 1862;ii;613-5; 1863;i;461-3, 573-5; 1865;ii;92-4, 300-3.

8 R Clement Lucas. Dr Pavy’s memoir. Guy’s Hospital Gazette 1893;27:55.

9 The eightieth birthday of Dr Pavy. Lancet 1909;i;1538.

10 Guy’s Hospital Gazette 1911;25:394.

11 Pavy FW. Saccharine matter: its physiological relations in the animal economy. Guy’s Hospital Reports 1853;8:321-45.

12 Pavy FW, Godden W. Some recently elicited facts relating to carbohydrate metabolism and glycosuria. J Physiol 1891;4:199-208.

13 Olmsted JMD. Claude Bernard: physiologist. London: Cassell, 1939. For a short account of Bernard’s research in carbohydrate metabolism, see: Olmsted JMD. Claude Bernard 1813-79. Diabetes 1953;2:162-4.

14 Pavy FW. Researches on the nature of the normal destruction of sugar in the animal system. Guy’s Hosp Rep 1855;16:19-37.

15 Pavy FW. On the nature and treatment of diabetes. London: John Churchill, 1802.

16 Pavy FW. Physiology of the carbohydrates. London: J&A Churchill, 1894.

17 Olmsted JMD, Olmsted EH. Ref 3:99.

18 Olmsted JMD, Olmsted EH. Ref 3, p 132.

19 Gowland Hopkins F. Dr Pavy and diabetes. Science Progress 1912-13;7:13-47. Dr (later Sir) Frederick Gowland Hopkins (1861-1947), known as the Father of British Biochemistry, discovered vitamins for which he shared the 1929 Nobel Prize.

20 Pavy FW. Ref 15, p 48.

21 Pavy FW. Lettomanic Lectures on certain points connected with diabetes. Lancet 1860;i;580.

22 Pavy FW. On the recognition of sugar in healthy urine. Guy’s Hosp Rep 1876;21:413-27. Ernst Brücke (1819-1892) became Professor of Physiology in Vienna in 1849 and was one of the best known physiologists of the age. Henry Bence Jones (1813-1873) had studied under the chemist Liebig and published The chemistry of urine in 1857.

23 Pavy FW. Ref 15, p 73.

24 Paton DN. The physiology of the carbohydrates: our present knowledge of their relations to the animal economy. Edinburgh Med J 1894;40:481-91.

25 Pavy FW. The physiology of the carbohydrates: an epiphenomenon. London: J&A Churchill, 1895.

26 Pavy FW. The physiology of the carbohydrates: a rejoinder to Dr Paton’s further criticism. Br Med J 1896;i;454-6, 521-2, 584-7, 783-5.
Frederick Pavy: the last of the physician chemists

27 Pavy FW. Three lectures on the pathology and treatment of diabetes mellitus viewed by the light of present day knowledge. *Lancet* 1908;i:1499-506, 1577-84, 1727-40.

28 Pavy FW. On carbohydrate metabolism. A course of advanced lectures in physiology delivered at the University of London. May 1905. London: J & A Churchill 1906.

29 Hopkins FG. Ref 19, p 22.

30 William Prout. *Munk's Roll* 3:109-13.

31 Golding Bird (1814-1854) became Assistant Physician at Guy’s in 1843. His work on urinary deposits, printed in five editions between 1844 and 1857, strongly influenced the development of medical chemistry in England.

32 Pavy FW. Lettsomin Lectures on certain points connected with diabetes. *Lancet* 1860;i:503-4, 555-6.

33 Pavy FW. On the quantitative determination of sugar for clinical purposes by the ammoniated cupric test. *Lancet* 1884;i:376-7.

34 Sir George Johnson. Obituaries: *Br Med J* 1896;i:1477-9. *Lancet* 1896;i:1663-4. Johnson was known by the sobriquets ‘Kidney’ or ‘Cholera’ Johnson, he preferred the latter because the work he was most proud of was his introduction (1854) of castor oil for the treatment of cholera in place of the traditional bran and opium. All his obituaries refer to his combative nature and in the *Lancet* his language was described as often ‘more powerful than the occasion seemed to demand’.

35 Johnson G. Another new test for albumen. *Lancet* 1882;i:737-8.

36 Johnson G. A new and very delicate test for grape sugar. *Lancet* 1882;i:869-70.

37 Pavy FW. A new and very delicate test for grape sugar. *Lancet* 1882;i:995.

38 Pavy FW. Ref 16, p 228.

39 Review of *The medical adviser in life assurance* (Edward Henry Sievellong. London, 1873). *Br Med J* 1874;i:345-6.

40 Sir George Johnson. Some common sources of error in testing for sugar in the urine. *Lancet* 1894;i:11-13.

41 Pavy FW. Some common sources of error in testing for sugar in the urine. *Lancet* 1894;i:110, 164, 224, 341, 406.

42 Sir George Johnson. The absence of sugar from normal urine proved by a new and simple method. *Lancet* 1895;i:87-90.

43 Johnson G (see Ref 42). *Lancet* 1895;i:442-3.

44 Taylor F. In memoriam. Ref 1, p 15.

45 Cameron HC. Ref 1, p 237.

46 Edward Payson Weston. *Dictionary of American Biography* No. 20. New York: Charles Scribners & Sons, 1956, 18-19.

47 *The Times*. 1876; Monday 13 March.

48 Pavy FW. The effect of prolonged muscular exercise on the system. *Lancet* 1876;i:319-20, 353-6, 392-4, 429-32.

49 Editorial: Weston’s last feat. *Lancet* 1876;i:439.

50 Pavy FW. The effect of prolonged muscular exercise on the urine in relation to the source of muscular power. *Lancet* 1876;i:741-3, 815-8, 848-50, 887-9; 1877;i:42-44.

51 J.F. *Lancet* 1866; 23rd June.

52 Flint A. On the physiological effects of severe and protracted muscular exertion. *New York Med J* 1871; June: 78.

53 The dispute is covered in detail in: Judith Moore. *A zeal for responsibility: the struggle for professional nursing in Victorian England* 1868-1883 (Georgia, 1988) pp 53-97; and Keir Waddington. The nursing dispute at Guy’s Hospital 1879-1880. *Soc Hist Med* 1995;5:211-30.

54 Carol Helmsdatter. Robert Bentley Todd, Saint John’s House and the origins of the modern trained nurse. *Hist Med* 1993;5:282-319.

55 All these letters are preserved in the Guy’s Archive at the Greater London Record Office.

56 Ref 55, H9/GY/A229/1.

57 Ref 55, H9/GY/A219/15.

58 A member of the staff. Nursing at Guy’s Hospital. *Br Med J* 1886;i:110.

59 Report of the Proceedings of a General Court of the Governors, 3 March 1880, pp 1-74. (H9/GY/A225/1) and 10 March 1880, pp 77-115. (H9/GY/A225/2-3).

60 Ref 59, p 52.

61 Ref 59, p 77.

62 Ref 59, p 105.

63 Ref 59, p 115. Getting patients up earlier was one of Miss Burt’s changes.

64 Ref 59, p 136.

65 Ref 59, p 30.

66 Margaret Lonsdale. The present crisis at Guy’s Hospital. *Nineteenth Century* 1880; April: 677-84.

67 Sir William Gull. On the nursing crisis at Guy’s Hospital. *Nineteenth Century* 1880; May 884-91. Habershon SO. The nursing crisis at Guy’s Hospital. *Nineteenth Century* 1880; May 892-901.

68 Walter Moxon (1836-1886) was another who, like Gull and Pavy, spent his whole working life at Guy’s. He was remembered by contemporaries for his gifted and unconventional personality. *Munk’s Roll* 4:164. Obituary. *Lancet* 1886;ii:273-316.

69 Ref 55, H9/GY/A219/24.

70 Ref 59, H9/GY/S219/27. Announcing their resignation on November 20th, the *British Medical Journal* suggested that it was unlikely to lead to any fresh appointments because ‘the number of beds available at Guy’s has, unfortunately, been greatly reduced during the last year or two in consequence of losses and financial deficits in the revenue of the hospital’. *Br Med J* 1880;ii:821.

71 Leading article. Guys Hospital. *Br Med J* 1880;ii:626-7.

72 Leading article. *Lancet* 1880;ii:662-3. Rorke’s Drift (January 1879) was a heroic rearguard action by the British against a large Zulu army. Eleven Victoria Crosses were awarded, a record for a single action. See: Donald R Morris. *The waging of the spear*. London: Jonathan Cape, 1966.

73 Pavy FW. The situation at Guy’s. *Lancet* 1880;ii:714.

74 Leading article. The medical aspects of the Guy’s Hospital case. *Br Med J*1880;ii:307.

75 Letter to the President and the Censors of the Royal College of Physicians. September 14th, 1880.

76 Letter from Pavy to the Treasurer. July 9th, 1880 (H9/GY/A223/8).

77 A full account of the trial can be found in the *Times* 1880; August 6th, p 11; and August 9th, p 4.

78 Up to this time patient records were regarded as the property of the Physician while administrative records belonged to the Treasurer. See: Barbara L Craig. The role of records and recordkeeping in the development of the modern hospital in London, England and Ontario, Canada 1890-1940. *Hist Med* 1991;65:376-97.

79 Walter Moxon. Sir William Gull and the Guy’s Hospital case. *Br Med J*1880;ii:316.

80 Leading article. *Lancet* 1880;ii:263-6.

81 *Br Med J* Note 74 above.

82 Pavy FW. The inquest at Guy’s. Letter to the *Times*. August 7th, 1880, p 9.

83 *Lancet* 1880;i:263.

84 Annotation. The Pavy gymnasmium at Guy’s Hospital. *Lancet* 1890;i:776.

85 Epitaph. Pavy and diabetes. *JAMA* 1913;60:1159-60.

86 Frederick Taylor. Ref 1, p 9.

87 Obituary. *Guy’s Hosp Gazette* 1911;25:393-6.

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