

Part One: Invention



The Celebrity

Despite his immense wealth, Sir William Perkin seldom travelled abroad. He had visited friends and colleagues in Germany and France, and had once been to the United States, but he found the experience tiring and quickly grew weary of sightseeing. Eight days to cross the Atlantic with nothing to do but read and look at the waves. Sometimes the sea made him nauseous.

In the autumn of 1906, at the age of sixty-eight, he resolved to give travelling another chance. On 23 September he boarded RMS *Umbria*, bound for New York, taking with him his wife Alexandrine and two of their four children. He spent much of the voyage writing in his first-class cabin; he had a speech to give a few days after arrival, and some letters to attend to. He had recently received a request from a chemist in Germany asking for details of his early life for a lecture he hoped to deliver to his students. Perkin was famous now, and each post seemed to bring enquiries about his career and invitations to celebrations.

He wrote in a modest and unflowery style. 'The first public laboratory I worked in was the Royal College of Chemistry in Oxford Street, London, in 1853–1856.' It wasn't like the great electric laboratories of today, he noted, with your huge booming furnaces. 'There were no Bunsen burners – we had short lengths of iron tube covered with wire gauze.' It was a grey place. There were many nasty explosions.

As the *Umbria* pushed on, newspapers throughout North America excitedly carried the news of Perkin's imminent arrival. 'Famous Chemist Visits Here,' announced the *Santa Ana Evening Blade*. 'British Invade City Hall,' said the *New York Globe*. In most cities the very fact that Perkin had boarded a steamship was enough to make the front page, but the coverage was nothing compared to that greeting his arrival.

Perkin and family disembarked in New York, where they were met by Professor Charles Chandler of Columbia University. There is a photograph of them all at the quay in their heavy tweeds and woollen coats, and they don't look particularly thrilled to be there. I'm weary, Perkin told one reporter who met him at Professor Chandler's apartment in midtown Manhattan. A few days later, the *New York Herald* racked up a list of his achievements, and proclaimed: 'Coal Tar Wizard, Just Arrived in Country, Transmuted Liquid Dross To Gold'. In this story, Perkin had been elevated to the status of scientific saint, his merits placed alongside those of Watt and Stephenson, Morse and Bell.

Everyone wanted to meet him. His schedule was frantic. On Saturday night there would be a big dinner in his honour at Delmonico's, New York City's premier banqueting hall. But before then, there was some flesh-pressing and some sightseeing. On Monday he would be the guest of George F. Kunz, the gem expert at Tiffany's, who said he would escort him and his family around various stores of interest to chemists. The Perkins would then visit the zoo, New York Botanical Garden and the Museum of Art. The next day they were off to the country home, in Floyd's Neck, Long Island, of William J. Matheson, a representative of a large German chemical firm. On Wednesday he would spend time with the mayor of New York, George B. McClellan. On Thursday, H. H. Rogers would take them on his yacht for

a sail up the Hudson, and the next day it would be the Laurel Hill Chemical Works. The Sunday after the banquet there would be a leisurely evening at the Chemists' Club on 55th Street.

Then there was Boston for more of the same, and then Washington DC, where Perkin was due to meet President Roosevelt. The party was then booked in at Niagara Falls, followed by Montreal and Quebec City, and then back to the United States for honorary degrees from Columbia in New York and Johns Hopkins in Baltimore.

Like many tourists before and since, Perkin found that Boston reminded him of English cities, and he especially enjoyed his trip out to Charlestown to see the battleship *Rhode Island*. 'I am greatly looking forward to meeting your President,' Perkin said as he boarded the Colonial Express bound for Washington. 'It is a certain honour,' Perkin told everyone who asked all about his great discovery. 'I was in the laboratory of the German chemist Hofmann,' he explained, his comments recorded a day later in the *Little Rock Gazette*. 'I was then eighteen. While working on an experiment, I failed, and was about to throw a certain black residue away when I thought it might be interesting. The solution of it resulted in a strangely beautiful colour. You know the rest.'

About 400 people gathered at Delmonico's at 7 p.m. One reporter present noted how 'If burial in Westminster Abbey is the highest of posthumous honours in the Anglo-Saxon world, we doubt whether a famous Englishman can receive a surer proof of his living apotheosis than when he is entertained by a company of representative Americans at Delmonico's.'

The banqueting room, a place of huge chandeliers and gilt mirrors, had been got up in English, American and German flags, and the top men (no women) from all walks of the chemical

and new industrial worlds sat around forty-four tables drinking Louis Roederer Carte Blanche and telling stories about booming business and fantastic inventions. At least half of them wore fashionable moustaches. Their menu cards had been embossed, each carrying a brightly coloured tassel and a picture of Perkin looking like a benevolent country clergyman. The gold inscription read, 'Dinner in honour of Sir William Henry Perkin by his American friends to commemorate the 50th anniversary of his discovery'.

On everyone's plate lay a facsimile copy of a London patent from 1856. 'Now know ye,' it proclaimed, 'That I, the said William Henry Perkin, do hereby declare the nature of my said Invention, and in what manner the same is to be performed . . .'

Before the first course arrived, which was oysters, those disappointed with the seating arrangements took to reading the full details of Perkin's invention. The chemists among them may have been surprised at its simplicity, but they would have conceded that fifty years ago they would have been astonished.

I take a cold solution of sulphate of aniline, or a cold solution of sulphate of toluidine, or a cold solution of sulphate of xyloidine, or a mixture of any one of such solutions with any others or other of them, and as much of a cold solution of a soluble bichromate as contains base enough to convert the sulphuric acid in any of the above-mentioned solutions into a neutral sulphate. I then mix the solutions and allow them to stand for ten or twelve hours, when the mixture will consist of a black powder and a solution of a neutral sulphate. I then throw this mixture upon a fine filter, and wash it with water till free from the neutral sulphate. I then dry the substance thus obtained at a temperature of 100 degrees centigrade, or 212 degrees Fahrenheit, and digest it repeatedly with coal-tar naphtha, until

it is free from a brown substance which is extracted by the naphtha. I then free the residue from the naphtha by evaporation, and digest it with methylated spirit . . . which dissolves out the new colouring matter.

The men clapped and shouted Huzzah! and Hoch! as the long-bearded fellow who had composed this recipe took his seat at the top table, and began ploughing through an elaborate meal. Beyond the oysters there was clear green turtle soup. Waiters then brought radishes and olives, and Terrapin à la Maryland. The saddle of lamb Aromatic came with brussels sprouts and chestnuts, the grouse with bread sauce and currant jelly, and for dessert there was a choice of cake, cheese, coffee and Nesselrode pudding. There was more champagne. The Louis Roederer was chased by Perrier Jouet Brut and Pommery Sec. And then at about 10 o'clock it was speech time, and a small orchestra appeared at the back of the hall.

The chairman for the evening was Professor Chandler, Perkin's host in Manhattan, and he spoke of how moved he was to have such a great man in his presence. He mentioned a fund that had been set up to finance a chemical library at the Chemists' Club (to be called the Perkin Library). The professor observed that there was not yet a single specialist chemistry reference library in the whole of America, and how such an institution would serve people far better than just another scholarship. He then proposed a toast to the President of the United States, the King of England and the Emperor of Germany, and everyone pushed their chairs back and joined in what they knew of 'The Star-Spangled Banner', 'Rule Britannia' and 'Die Wacht am Rhein'.

Then a man from the Mayor's office got up to read some old doggerel, which he dedicated to Perkin:

Come in the evening, or come in the morning,
Come when you're looked for, and come without warning:
A welcome and kisses you'll find here before you,
And the oftener you come the more we'll adore you.

Now it was the turn of Dr Hugo Schweitzer, a German who had worked under Robert Wilhelm Bunsen in Heidelberg. Schweitzer was also the man who had spent the best part of a year organising the present gathering. He had some alarming news: what he had to say about Perkin might take fifteen hours. The diners looked at each other, perhaps wondering what would be served for breakfast. But they cheered when Schweitzer said he hoped to condense it into fifteen minutes. A week later, one Boston newspaper would describe how, during the speech, 'vividly before one's mind . . . trooped the great ordered cycles of the scientific progress of the last half-century'.

Schweitzer had got to know Perkin on a trip to London the previous year, and it was here that he had learnt of the background to his great discovery. 'It is hard to realise today what an epoch-making idea it was at that time,' he said. 'It was truly the spark of genius . . .'

Schweitzer explained that Perkin's discovery, which involved a specific treatment of coal-tar, was important not only for its direct and obvious effect, but also for the great many chemical advances it inspired. Perkin was indirectly responsible for enormous advances in medicine, perfumery, food, explosives and photography, and yet few beyond the immediate gathering appreciated his contribution. Even the newspapers which heralded his arrival did not fully acknowledge his achievements, and couldn't possibly estimate the debt their own trade owed to Perkin.

As Schweitzer spoke, his words were interrupted by cheers and applause. Perhaps his audience also felt envy, for it was clear

that no one present could hope to match the impact that Perkin had already had upon the world. How was it that one man possessed so much energy?

In 1856, Perkin had discovered the first aniline dye, the first famous artificial colour to be derived from coal. From coal: now, fifty years later, no one regarded this as in the least bit extraordinary. But some older diners remembered the initial rumpus, the huge rage – how someone, a very young man, had found how to make colour from coal . . . If they had remembered it accurately, they would have recalled years of torment.

Now, fifty years on, there were 2,000 artificial colours, all stemming from Perkin's work. Initially, his colours were used on wool, silk, cotton and linen, but matters had progressed.

'The lady's hair is grey, or of a hue not fashionable at the time [but] coal-tar colours will assist her in appearing youthful and gay,' Dr Schweitzer explained. 'In eating the luscious frankfurter, your soul rejoices to see the sanguineous liquid oozing from the meat – alas, coal-tar colours have done it. The product of the hen is replaced by yellow coal-tar colours in custard powders . . . leather, paper, bones, ivory, feathers, straw, grasses are all coloured, and one of the most interesting applications is the dyeing of whole pieces of furniture by dipping them in large tanks, which transforms the wood into walnut, mahogany at your command, as carried out in our big factories in Grand Rapids.'

But actually this was nothing. Perkin's discovery made sick people healthy. Coal-tar derivatives had enabled the German bacteriologist Paul Ehrlich to pioneer immunology and chemotherapy. The German scientist Robert Koch was grateful to Perkin for his discoveries of the tuberculosis and cholera bacilli. Dr Schweitzer suggested that Perkin's work had led indirectly to groundbreaking advances in the relief of pain in those with cancer.

Perhaps sensing disbelief in his audience, Schweitzer was relieved to find he could now regale them with a reasonable anecdote. He spoke of how only a few years ago a man called Fahlberg was working at Johns Hopkins and experimenting with coal-tar derivatives for scientific purposes. 'Before leaving the laboratory one evening he thoroughly washed his hands, and was under the impression that he had taken every pain in doing so. He was therefore greatly surprised on finding that, during his meal, when carrying bread to his mouth, the bread had a sweet taste.

'He suspected that his landlady had unintentionally sweetened the bread and called her to account. They had a little discussion, from which she emerged the victor. It was not the bread that tasted sweet, but his hands, and much to his surprise he noted that not only his hands but his arms had a sweet taste. The only explanation he could think of was that he had brought some chemical along from the laboratory. Rushing back to it and carefully investigating the taste of all the goblets, glasses and dishes standing on the working table, he finally came across one whose contents seemed to possess a remarkably sweet taste. Thus was made this remarkable discovery.'

Fahlberg had stumbled upon saccharin, four pounds of which possessed the sweetening power of a ton of beet sugar. He conducted some researches to find whether it was harmful to animals, and, no adverse effects being detected, was soon hailed as the founder of a huge new industry. At the time of the banquet in New York, the United States government had imposed laws banning saccharin as a sugar replacement in food on account of the devastating effects it was having on the sugar industry. This story was particularly appreciated by Professor Ira Remsen, who sat two places away from William Perkin on the top table. Fahlberg was working in Remsen's laboratory at the time of this incident.

Meanwhile, Dr Schweitzer was reaching a conclusion, and briefly mentioned that Perkin was, predictably by this stage, very much responsible for the way women smelt, having once formed coumarin from coal-tar, which led to artificial musk, and then to the artificial production of the scents of violets, roses, jasmine and the 'smell of the year' – oil of wintergreen.

The same compound which formed artificial perfume was subsequently used with nitroglycerine as an explosive in the mines and as a weapon ('the smokeless powder of the Russo-Japanese war'). Soldiers would also be grateful to Perkin for artificial salicylic and benzoic acids, both used to preserve canned foods.

At the beginning of the evening, a photographer had climbed on a ladder in the corner of the room and asked everyone to turn their chairs to face him. Almost everyone looked his way apart from Perkin, who chose to look ahead into the middle distance (Perkin was interested in the use of bags to take up the smoke of the flashlight, thus limiting the fumes of magnesium). The trick was, the photographer knew, 'I can see you if you can see me' and today we can still see them all – a remarkable record of the most distinguished chemists of the day trying their best to keep their eyes open for the duration of the long exposure.

The art of photography, naturally, was greatly enhanced by Perkin. At the time of the dinner, coal-tar preparations were responsible for the development of films and plates, and coal-tar colours improved the sensitivity of photographic emulsion, thus making it suitable for everyday snapshots. Further, in that very year, Auguste and Louis Lumière introduced Autochrome plates, the first practical application of coal-tar colour materials in photography.

Clearly, the speaker concluded, 'the world cannot spare such an extraordinary man. May his life be spared to us for

many years to come, and may it be replete with health and happiness.'

This tone was sustained when Dr William Nichols, president of the US General Chemical Company, presented Perkin with the first gold impression of the Perkin Medal, henceforth to be awarded annually to only the most distinguished of American chemists. Charged with drink and the desire to better all that had gone before, Dr Nichols went for the big finish. This is the age of destruction, he announced, but his fellow chemists had a mission, and it was no less than 'saving the world from starvation'.

'Honoured by your king, by your fellow chemists, by the world,' Nichols said, as he looked down the table to Perkin, 'you may pass down the hillsides toward the setting sun with a clear conscience. You have seen the dawn of the golden age – the age of chemistry – that science which by synthesis will gather together the fragments and wastes of the other dynasties, and build for the world a civilisation which will last until the end.'

Then he sat down. A few places down the table Adolf Kutroff removed his napkin. Kutroff was one of the pioneers of the coal-tar industry in the United States, and tonight had the task of presenting Perkin with an eight-piece silver tea service, each piece inscribed with the details of one of the Englishman's discoveries.

At the very end of the dinner, and just at that time when the evening's alcohol was beginning its downward path towards stupor and headache, Sir William himself got up to speak. The crowd roused themselves once more, and really cheered. He had a deep, clear voice, and he blinked a lot as he spoke, perhaps out of modesty and shyness. Those next to him at his table noticed how he had not been drinking at all – he had been teetotal for many years. He held in his hand the speech he had

written on the *Umbria*, but his first words were a mass of improvised retorts; they had thanked him, and so he must thank them, and they could have gone on back and forth like that all night. It was twenty-four years since he had last been to New York, and on his last trip far fewer people seemed to know who he was. But everything now was a great honour – the library, the medal, the tea service. ‘I do not feel strange with you,’ he said. ‘And it may perhaps interest you to know something of my early days and how I became a chemist.’

He spoke for ten minutes about his school and his great discovery, and of the hard time he had convincing others that he had found something that might be of significance – and yet he said that even he didn’t dream of what that significance might be. He was only eighteen, after all. Who else could have imagined that this filthy thick coal-tar could contain all it did? And he was lucky, because it transpired that his great invention occurred purely by chance, and it was not what he was looking for at all.

Tumult as he sat down. More toasts. Sighs as other men got up. Dr Nicholas Buller, President of Columbia, declared that democracy depends on scientific discovery. ‘The age wants the man who knows. The nation will most progress that follows the advice of the men who know. The guest of the evening is a man who knows.’

Dr Ira Remsen said he knew it was getting late, but there was surely time for another rendition of ‘Blessed Be the Tie that Binds.’ It was a suitable song, he said. ‘A pun.’

After this, the eminent scientists hailed carriages for home, or to their Manhattan hotels, and perhaps they told their partners that it had been an historical evening, and what great food. Then they all did one identical thing. Their invitation to this jubilee announced that it was a black-tie affair, but with a twist. Their dinner jackets were to be black, but their bow-ties were



Mauve

to be of a different colour, in recognition of the colour that had started it all off for Perkin, the colour that had chanced to change the world.

Two weeks before the event, each of the diners received a brown envelope containing a new necktie, dyed for the occasion by the St Denis Dyestuff and Chemical Company, France. The colour was often identified as a shade of purple, but for one night only there would be no mistaking its precise hue.

The men all wore it to the banquet, and now, well past midnight, they each removed it, and perhaps made a mental note to keep it safe, a perfect souvenir from a famous night in honour of a man who had invented the colour mauve.

Chapter Two

Not the Land of Science

Sugar Ray Leonard slipped out of his red and black Ferrari Boxer Berlinetta, strode through the front door of Jamesons restaurant in Bethesda, Maryland, and made his way to the bar. Leonard always seems to be the handsomest man in the room, especially when someone calls his name and he flashes that dazzling smile, and on this August afternoon he looked as if he had stepped right out of the pages of *GQ*.

He wore a mauve cardigan, a light mauve shirt with the cuffs folded meticulously over the sweaters' cuffs, mauve suspenders embroidered with figures of Cupid.

'I feel great, I really do,' Leonard said.

Former World Welterweight Boxing Champion Sugar Ray Leonard profiled in Sports Illustrated, 1986

In May 1956, precisely one century after the discovery of mauve, a trades journal entitled *The Dyer, Textile Printer, Bleacher and Finisher* carried a warning for its subscribers. 'Readers who have thoughts of making a pilgrimage to Shadwell to see Perkin's birthplace would be well advised not to delay,' wrote the journal's editor Laurence E. Morris. 'For the site has been scheduled for redevelopment.' Once the developers moved in there was no stopping them. The site has been the subject of significant municipal improvement three times in the last four decades.

King David Lane, Upper Shadwell, is a short street containing Blue Gate School and an ugly office block, and practically nothing remains from the area in which William Perkin was born on 12 March 1838. Today's visitor finds that King David Lane has become one-way, built up with islands and bollards and signs. The road connects Cable Street – a string of council estates – to The Highway, a thundering four-lane parade of trucks and speeding Ford Mondeos. Number 3 King David Lane, where Perkin was born at home as the last of seven children, has been demolished. Like much of the East End of London, little looks the way it did before the last war.

The oldest structure is the parish church of St Paul's, a small building with an incisively tall spire. Built in 1669, the last of five London churches constructed during the Restoration, it has some famous names to its history. John Wesley preached here. Captain James Cook was an active parishioner and baptised his first son here. Jane Randolph, the mother of Thomas Jefferson, was also baptised at the church, as was William Perkin in 1838. There is a little graveyard around the church, but it is impossible to read the gravestones. In the church crypt you will find the Green Gables Montessori School.

Behind the church there is a footpath leading to many converted wharves, where those who live there can have breakfast on little terraces overlooking the Thames. Beneath them are offices for security guards and estate agents. At Shadwell Basin you may go angling and canoeing, and admire the view towards Canary Wharf and the Millennium Dome.

Forty years ago, Perkin's birthplace became A. E. Wolfe, beef and pork butcher. When that went, and the shop and rooms above it were knocked down, another new estate went up. Opposite this stands a council block called Martineau that once used to be 1 King David Fort, the house and stables the Perkins

leased when William was in his teens. On one corner of this building there is a round blue plaque affixed by the Stepney Historical Trust: 'Sir William Henry Perkin, FRS, discovered the first aniline dyestuff, March 1856, while working in his home laboratory on this site, and went on to found science-based industry.' No one you meet who lives here today knows very much about him.

When he was in his twenties, William Perkin went to Leeds on business and found time to visit the house of his late grandfather, Thomas Perkin, born in 1757, of a line of Yorkshire farmers. Thomas became a leather worker, but his grandson was moved to find that he also had a rare hobby. On visiting his house at Black Thornton, near Ingleton, Perkin found a cellar containing what looked to be a laboratory. There was a still and a small smelting furnace, and various jars with grimy burnt mixtures. It was a strange stash to find in this rural community; on asking around, Perkin learnt that his grandfather had been an alchemist, and had attempted to transmute base metal into gold.

Thomas Perkin's leatherwork led him to London, where he appears to have switched trades to become a carpenter and boat-builder. His only son, George Fowler Perkin, who was born in 1802, also became a carpenter, and a successful one. He employed twelve men, and engaged them exclusively in building the new terraced housing for the local dock workers. By today's standards, his family would be judged parvenu middle class.

Not long after his birth, William Perkin's family moved into a larger three-storey house close by, a few yards north of the High Street, a place known as King David Fort. They employed servants, and were one of the wealthiest families in the area. Their house stood out, a neighbourhood talking point. Shadwell,

particularly the lower side by the docks, had some of the most wretched and crowded slums in the East End. One visitor in the early nineteenth century noted that ‘thousands of useful tradesmen, artisans and mechanics inhabit, but their homes and workshops will not bear description, nor are the streets, courts, lanes and alleys by any means inviting.’

Victorian writers liked to remark on the extremes of London’s poverty and wealth, virtue and iniquity. When Henry Mayhew viewed the city from a hot-air balloon in the middle of the century he was struck by the presence of mass destitution so close to the great institutions of trade, finance and empire. In Shadwell, the Perkins encountered such extremes on a daily basis. Disease was all around them. William Perkin was to lose both eldest sister and brother to tuberculosis. Their mother Sarah, a woman of Scottish descent who had moved to east London when she was a child, was thought never to have recovered from her losses.

The Perkins grew up opposite the police station, from where they witnessed an endless stream of the drunk and lawless. Much of the police work centred on a pub named Paddy’s Goose, where local seamen sought prostitutes, and the unwary were press-ganged into the Royal Navy.

William Perkin attended the private Arbour Terrace School in Commercial Road, a few hundreds yards from his home. He was a gifted student, with many interests outside the standard curriculum. ‘He showed remarkable dexterity in all kinds of hobbies,’ his nephew Arthur H. Waters recalled. Waters’s mother was about two years older than Perkin. ‘They were fond of taking long rambles together, and William was particularly keen on natural history and botany. On one occasion he produced a large pipe and tobacco and proceeded to puff away manfully. But after a time he became so confoundedly ill that his sister had some

difficulty in getting him home. William's craze for probing into everything, especially small things, seems to show that his wonderful instinct for research was present at a very early age.'

He became interested in photography when he was twelve, and at fourteen he took his own picture: he has a stony look, his broad forehead and strong features framed by dense black hair. He is done up in evening gear, or perhaps his church best, and he looks about twenty.

'I do not quite know where to begin,' he wrote to his colleague Heinrich Caro in 1891. 'But as the circumstances connected with my childhood and youth had, I believe, a good deal to do in influencing me in respect to practical matters, I have ventured to relate a little connected with that period for your private information.'

Caro, from 1869 to 1890 the principal investor at BASF, had written to Perkin a few weeks earlier, explaining that he was preparing the first major history of the dye industry and would like more details about his early life. Perkin wrote that he would help him with the facts as he could remember them, but midway through his reply he had a change of heart. 'I have now written you out an account of my early days, which I have never done before, and now I have done so feel some hesitation in sending it to you.' Why this should be so he did not say, but he remained a meek and demure man throughout his life. He said later that he believed only his work was important.

At the beginning he had no idea what he wanted to do with his life, though he fancied something artistic, or something practical he could do with his hands. 'Being interested in what I saw going on around me, I thought I would follow in my father's footsteps,' he wrote. He built wooden models, among other things of the steam trains he saw passing near his home. He was also drawn to engineering, and liked the illustrations of

levers and pulleys he saw in a book called *The Artisan*. Published in 1828, this contained a popular summary of what was then known about mechanics, optics, magnetism and pneumatics, all of it written with an element of wonder and disbelief that science was moving so rapidly.

But Perkin was being pulled in other ways. 'I took a great interest in painting,' he explained, 'and for a short time had the mad idea that I should like to be an artist.' There was also music – he learnt the violin and double bass, and he and his brother and two sisters entertained thoughts of becoming a travelling quartet. But just before his thirteenth birthday a friend showed him some elementary experiments with crystals that he regarded as 'quite marvellous'.

'I saw chemistry was something far higher than any other subject that had come before me,' he remembered. 'I thought that if I could be articled to a pharmacist I should be happy.'

In another telling of the story, Perkin again flattened the drama. 'The possibility also of making new discoveries impressed me very much. I determined if possible to accumulate bottles of chemicals and make experiments.'

When he was thirteen he joined 600 other boys at the City of London School in a narrow street by Cheapside, not far from St Paul's. It was a strict institution with painful punishments for misbehaviour, but its educational outlook was progressive. On his arrival, Perkin was delighted to learn that it was one of the few schools in the country to offer lessons in chemistry, a subject believed to have little practical use (and certainly less than Latin or Greek). The course was taught twice a week in the lunch-hour by a writing master called Thomas Hall, and Perkin persuaded his father to pay an extra seven shillings each term for the privilege. He skipped lunch to attend. 'Thomas Hall noticed that I took a great interest in the lectures, and made me

one of his helpers to prepare his lecture experiments. This was a wonderful lift for me . . . to work in the dismal place that was called a laboratory in that school.'

Hall suggested that Perkin might like to conduct some of the safer experiments at home, and helped him buy some glassware. Perkin's father again agreed to pay for his son's enthusiasms, although he made it clear he wished him to become an architect. Chemistry was fascinating, but there was no money in it.

Outside school, Perkin attended chemistry talks given by Henry Letheby at the London Hospital in Whitechapel Road, and both Letheby and Thomas Hall suggested to Perkin that he write to their friend Michael Faraday requesting permission to attend his monumental lectures at the Royal Institution. Faraday replied in his own hand, an act that delighted Perkin greatly, and so it was that on Saturday afternoons a fourteen-year-old boy found himself the youngest spectator of the latest developments in the peculiar science of electricity.

A few years before, the leading German scientist Justus Liebig had had some damning news for the delegates to the British Association meeting in Liverpool in 1837. 'England is not the land of science,' he declared. 'There is only widespread diletantism, their chemists are ashamed to be known by that name because it has been assumed by the apothecaries, who are despised.'

In contrast, Liebig's teaching laboratory at the University of Giessen was the envy of all experimental chemists, and men travelled hundreds of miles to engage in what their own countries believed to be an unrewarding pursuit. There were chairs in chemistry at both Oxford and Cambridge, but the idea that the subject should be taught and learnt in the laboratory was unheard of; students were merely taught chemical history as part of a

wider science course. At the University of Glasgow, a man named Thomas Thomson was probably the first to open up his laboratory to his students for practical instruction, and Thomas Graham, singled out by Liebig as a rare example of a forward-looking scientist, did the same at the city's Andersonian Institution in 1830. At the time of Perkin's birth there was no college anywhere in the country dedicated to the study of chemistry.

Liebig was an inspirational speaker, and it was his British lecture tour in the early 1840s which convinced men of influence that London needed a specialist chemical school (Liebig met the Prime Minister, Sir Robert Peel, who expressed personal interest due to his family's involvement in calico printing). There were plans to establish the Davy College of Practical Chemistry within the Royal Institution, but when these foundered, Sir James Clark, the Queen's physician, Michael Faraday and the Prince Consort, for years a keen sponsor of scientific research, established a private subscription to finance the Royal College of Chemistry, raising some £5,000, and counting both Peel and Gladstone among its contributors.

The College opened temporary laboratories just off Hanover Square in 1845, and moved a year later to a permanent site at the south side of Oxford Street. The building was soon full with twenty-six students, and its size dictated that lectures be held at the Museum of Practical Geology in Jermyn Street. It was here that Perkin's teacher Thomas Hall first came to hear the young director of the college, August Wilhelm von Hofmann.

Hofmann was born in Giessen in 1818, and first studied mathematics and physics before taking chemistry with Liebig. His appointment at the Royal College was widely favoured by Prince Albert, not least because he believed that Hofmann would make advances directly beneficial to agriculture. And there was another reason: in the summer of 1845, the Queen and Prince

Albert visited Bonn for the unveiling of the monument to Beethoven. Queen Victoria noted the occasion in her diary, and recorded what happened afterwards. 'We drove with the King and Queen [of Prussia] to Albert's former little house. It was such a pleasure for me to be able to see this house. We went all over it, and it is just as it was . . .' The lack of alteration was down to August Hofmann, who now lived there and occasionally conducted small chemical experiments in one of the rooms.

Thomas Hall believed that Perkin should enrol at the Royal College at fifteen, but there was severe opposition from Perkin's father. Why couldn't William be more like his older brother Thomas? Thomas was training to be an architect. 'My father was disappointed,' Perkin recorded years later. But Hall persuaded his father to meet Hofmann, who may have beguiled him with the exotic possibilities of benzene and aniline.

'He had several interviews with my father,' Perkin noted. 'And the end of it was that I went to study chemistry under Dr Hofmann.'

That was in 1853. Within five years, Perkin had made his fortune.