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CAPTURING THE LIGHT

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J'ai capturé la lumière fugitive et l'ai emprisonnée! J'ai contraint le soleil à peindre des images pour moi!

[I have captured the light and arrested its flight! The sun itself shall draw my pictures!]

Louis Daguerre,
letter to Charles Chevalier 1839[1]

I hope it will be borne in mind by those who take an interest in this subject, that in what I have hitherto done, I do not profess to have perfected an Art, but to have *commenced* one; the limits of which it is not possible at present exactly to ascertain.

I only claim to have based this new Art upon a secure foundation: it will be for more skilful hands than mine to rear the superstructure.

Henry Fox Talbot,
letter to the editor of *The Literary Gazette*, 1839[2]

Contents

MY FIRST DAGUERREOTYPE.

There never was anything like it. True, a multitude of "types" and "graphs" have been brought out since then, and glass and paper and iron and leather and divers vehicles have been covered with impressions, and I have seen them, but nothing ever filled my eye so completely as that first daguerreotype.

For hours I have held it, carefully noting all the soft minutiae of light and shade: and still the little rough-edged silver tablet was a joy forever, discovering some merit of complete similitude hitherto unnoted; it seemed inexhaustible, yielding new pleasure as often as consulted.

A small and pleasant village in central Indiana was the locus of this primitive achievement; the time I think, the fall of 1842. Seth, my coadjutor and compeer in the enterprise, and myself were denizens of a cosy Law Office, in the second story of an unpretending building, where we tumbled the musty tomes of legal lore, hoping in good time to make lawyers of ourselves. Seth was an artist, that is, he had wielded a pencil in his day and produced some landscapes, and even portraits which were not without merit; at least, so said the knowing ones, who pronounced him a genius undeveloped, and bewailed his aberration in reading law. At one time he had tried his hand at farming, being beguiled by the smell of new-mown hay, or more probably by the per-diem to the harvest hands, (for Seth was poor.) But that was only a temporary expedient, and he did not take kindly to association with those "whose talk was of oxen." I may mention that he afterwards turned up at New

Orleans, where he verified the predictions of his quondam friends, by making a sensation in the way of landscapes and of portraits, and so the world lost a poor lawyer and gained a reputable artist.

Having an eye out for the new and curious, I had seen some time before intimations in the public prints of a wonderful French discovery in the art of portraiture, whereby it seemed quite probable there was a royal road to drawing and picture-making; and indeed, that the time was not distant, when one might look in a mirror, and leave his image sticking there. But as greater marvels have in like manner been announced and never heard of afterwards, I was disposed to regard this new wonder as belonging to the same class, until I saw another account of the mystery, and this time coupled with the more tangible statement, that the images of a camera obscura were made permanently visible, and giving a kind of outline of the method.

Seth and I talked over the new discovery for several days, determining, if possible, to verify our deductions by a practical test, and with a view to elicit all the paragraph contained, and to obtain a more complete clue to the *modus operandi*, we tried our hand on interpretation, and by dint of different emphasis and modulation, we thought we could more completely evolve the seeming mystery. The result of this unfledged exercise of legal acumen was, that silver plates properly exposed to the vapors of iodine, and thus coated with a thin film of a yellow or golden color, became sensitive to the action of light and received the image, which could be made visible by the fumes of mercury, and rendered permanent by a wash of salt and water . . . The rest was easy of accomplishment, and with the judicious employment of pocket knives, tacks, paste, and the division of labor, a cigar box was soon transformed into a camera . . .

"A regular built picture, by jingo!", said Seth, as we slipped it into the salt water and admitted the light. Sure enough, there it was. The iodine was slowly clearing off; and as more light was admitted we saw our miniature landscape—that old shed, with its water-stained shingles in the fore-ground, the barn yard and its carts and wagons, and even those horses—a little misty, to be sure—but that white horse was unmistakable. The building in the distance—the church and its steeple, and the leafless trees. There was a dim, hazy look about the horizon, and a sad want of what I have since learned to denominate "aerial perspective;" but Seth said that softening down of the harsh lines was decidedly artistical. To me, it seemed a realization of what I suppose everybody has thought of—the skilful combination of all the elements of that delicate frost work which we see on the windows of a cold morning into the perfect semblance of a real and familiar scene.

After repeated rinsings we dried it on the stove. I confess there was quite a crystalization of salt on the surface, and some streaks, but still there was a picture—to me an inexhaustible source of wonder and admiration. Afterwards I progressed somewhat in the art; adopted new improvements, and took likenesses of learned lawyers, with numberless imposing looking volumes piled on the table beside them; sentimental young ladies with guitars in their hands, and beautiful bouquets in the back ground; matronly ladies, with pocket handkerchiefs of table-cloth dimensions; children, with staring eyes and corkscrew faces, and love-sick swains who persisted in sitting with a huge hand placed over the region of the heart, and who brought back the picture after a few days because the heart was on the wrong side.

All these, of course, I admired exceedingly—but still, I repeat, there never was anything like that first daguerreotype![1]

Chapter One

THE LOCKED TREASURE ROOM

Man has always been fascinated by the sun, from the primeval days of his existence when he first stood erect on the great wide savannahs of Africa and gazed up at it through protecting fingers. To him the sun was not just a potent force, a god – the giver of life, food, warmth – the regulator of his very existence – it was also the giver of light. In the book of Genesis light was God's first creation and sunlight for ever after became the fount of an age-old puzzle which, from the moment man began marshalling his thoughts in written form, he longed to solve.

With the dawn of civilization and the creation of the very first written texts, be it on clay tablets, stone or parchment, the quest to capture the light and channel it – that inbuilt human desire to harness the natural elements and make them work for us – first entered the minds of thinkers and scholars around the world. In the fifth century BCE the Chinese philosopher Mozi was one of the first to talk of the power of light and spoke of a device for passing sunlight through a pinhole onto a 'collecting plate', its mysterious function being that of a 'locked treasure room' – a kind of lightproof box that would channel the power of the sun in such a way that man could safely observe it and the images of the recognized world outside that it projected.[1]

Over the centuries this idea was regularly revisited by a

succession of scholars from the Greek thinker Aristotle, who noted the patterns created by sunlight filtered through trees onto the ground below, to the first properly scientific description made in the eleventh century by an Arab scholar named Ibn al Haythaim. In a seven-volume treatise on optics – the study of the behaviour of light and its interaction with the human eye – written by him between 1011 and 1021, al Haythaim described the optical principle of a pinhole camera obscura with a single small aperture for letting in the rays of light and wrote up experiments he made during his years in Cairo that demonstrated how light travelled in a straight line. The *Book of Optics* was translated into Latin in manuscript form in the late twelfth century and finally printed in 1572. The use of the pinhole camera, in combination with glass lenses, in studying and understanding how light worked, was soon after discussed in the writings of the English Franciscan friar and scholar Roger Bacon, who may have read al Haythaim in translation, and also wrote on the other-worldly and more spiritual and magical qualities of light as the source of all creation. The key to harnessing it, as Bacon saw it, lay in the enlistment of optics, as he observed in his *Opus Majus* completed in 1267:

> It is possible that some other science may be more useful, but no other science has so much sweetness and beauty of utility. Therefore it is the flower of the whole of philosophy and through it, and not without it, can the other sciences be known.[2]

The first camera obscuras used in the study of light in this period were quite large, hence the name, which means 'dark chamber'. They were effectively small darkened rooms into which the light was projected through a small pinhole, producing an inverted image of the scene outside on an opposite wall. Such chambers were particularly popular for safely observing

solar eclipses and were used by Bacon for this purpose in the thirteenth century. From this original incarnation the pinhole camera was rapidly developed into a more practical camera obscura that could be adapted to different technical uses – most importantly, for directing natural light onto paper for use by artists and draftsmen in making accurate drawings from real life. By the sixteenth century the camera obscura had been dramatically reduced in size – down to that of a portable wooden box with a lens on one end and a ground glass to focus the image on at the other that could be set up on a table or stand anywhere. In this way a scene or object could be projected onto paper, and the camera obscura was increasingly used by artists to create a template for paintings executed later at their leisure back in the studio.

The greatest early exponent of the device was the artist Leonardo da Vinci, who during the Renaissance used the camera obscura to help him with the drawing of perspective; in his notebooks he described its use in his discourse on the function of the human eye. The painters Velazquez and Vermeer followed da Vinci as leading advocates of the camera obscura's use in the seventeenth century and the Italian master of waterscapes, Canaletto, made extensive use of it in order to create his vast, magical scenes of Venice in the century that followed. Scientific enquiry into the nature of light meanwhile reached its high point with Isaac Newton's seminal work on the subject during the 1670s which culminated in the publication in 1704 of his *Opticks*. In it, Newton unknowingly predicted the science of photochemistry when he remarked that 'The changing of Bodies into Light, and Light into Bodies, is very conformable to the course of Nature, which seems delighted with Transmutation.'[3]

Newton's ground-breaking work on optics, combined with his study of gravity and the orbit of the planets, marked a

watershed between the end of the dark age of alchemy – the art of 'transmutation' to which Newton alluded in his guise as the 'last of the magicians' – to the new age of practical science.[4] It came at the point at which scholars were making the dramatic leap from the metaphysical and philosophical discourse of how things might or could be done into serious empirical research and experimentation in the laboratory. This new age of scientific enquiry, based on experimental verification, was fostered by the work of the Royal Society in London, which took as its motto '*Nullius in verba*' – effectively meaning, 'Take nobody's word for it'.

Such is human inventiveness and curiosity that it was not long in the new eighteenth century before some of those who looked at the images in the camera obscura began wondering whether they could push the boundaries of its use. Might it ever be possible, they wondered, for the delicate images they saw projected through its pinhole or via lenses to be captured permanently onto paper or some other medium? Was it conceivable that a way could be found, through the enlistment of chemicals in fixing that image, to cause the image in the camera obscura to be frozen in time, in all its perfection? Would man ever be able to achieve the till then unthinkable, and make nature paint her own portrait?

By the end of the eighteenth century numerous practitioners – scientists, artists, astronomers, as well as businessmen and entrepreneurs – were beginning to broach this great puzzle, although investigation into light and how it worked was but one facet of the thrilling and tumultuous new period of scientific enquiry and invention across Europe that became known as the Age of Enlightenment. It brought with it the dawn of a new mechanical age that spurred inventors to design machines that could do what till then had only been done by the human hand.

Scientific experimentation at this time was largely the domain of gentlemen of leisure, of men – and with a very few exceptions, extraordinary women – grounded in the kind of classical education and private means enjoyed only by the moneyed classes. But there was also by the mid-eighteenth century a new generation of thinkers and inventors that had sprung up amid the thrusting new mercantile classes in the industrial heartland of England. No group more typified the extraordinary coming together of the exciting and disparate scientific talents of the age, and one that cut across religion and class, than the Lunar Men.

Chapter Two

SHADOWGRAMS

They called themselves the Lunar Men but the reason was prosaic rather than deliberately obscure or mysterious. The fourteen or so members of this small provincial society began meeting monthly in the late 1750s on the first Monday nearest to the full moon as a matter of practicality. At such times there would be more light in the sky to get home by when their meetings were over; although, as intellectuals, they were not unaware of the significance of the full moon as a time for conjuring the powers of darkness. And so, in a humorous nod to age-old superstition, they dubbed themselves the 'Lunarticks'. But they didn't meet in London in some grand institution or learned society; at first they simply discussed the latest scientific enquiry and invention over dinner in each other's home. Later they transferred their meetings to the Shakespeare Tavern in the freethinking, Nonconformist stronghold of Birmingham, a manufacturing city in the Midlands that by the mid-century was leading the way in industrial innovation.

The leading Lunar Men were an eclectic mix of talents who exemplified the age: Erasmus Darwin, a physician, philosopher and reformer, and grandfather of the much more renowned Charles, who even today still overshadows him; the abolitionist and porcelain manufacturer from nearby Stoke-on-Trent, Josiah Wedgwood; Matthew Boulton, another

highly successful manufacturer – of metal goods – who with his business partner and fellow Lunar Man James Watt pioneered the steam engine; and chemist Joseph Priestley a Nonconformist clergyman and outstanding scientist of the day who in 1774 would discover and describe the properties of oxygen. Together, these extraordinary individuals 'classified plants and isolated gases, they built clocks and telescopes, they flew in hot-air balloons and invented machines that could speak, performed tricks with magnets and dreamt up recipes for disappearing ink'.[1] It was men like this who blazed the scientific trail for the invention of photography in the century that followed. Erasmus Darwin, of all of them, foresaw what might one day be achieved; in his *Zoonomia*, published in the 1790s, he discussed visual perception, likening the camera obscura to the human eye, and in so doing reiterated man's age-old aspiration to make copies of the things he saw in the natural world around him.

> GENTLE READER! LO here a Camera Obscura is presented to thy view, in which are lights and shades dancing on a white canvas, and magnified into apparent life! – if thou art perfectly at leisure for such trivial amusement, walk in, and view the wonders of my ENCHANTED GARDEN.

The thought of entering that enchanted garden was a tantalizing one indeed, and even more so the possibility of finding a way of preserving an image of what it contained.

*

Tom Wedgwood, born in 1771, the fourth and youngest son of Josiah the potter, was very much the inheritor of Erasmus Darwin's enquiring mind and the atmosphere of scientific experimentation fostered by the Lunar Men. He should have

followed Josiah into the pottery trade, but he was, from childhood, plagued by ill health. But in the philanthropic tradition of the Lunar Men he had a keen social conscience and a sense of the responsibility that his family wealth brought him and channelled his failing energies into education and moral improvement. Tom was, wrote one friend, 'a strange and wonderful being. Full of goodness, benevolence, with a mind stored with ideas . . . A man of wonderful talents, a tact of taste, acute beyond description – with even good-nature and mild manners.'[2]

His father's involvement with the Lunar Society and the frequent visits to his home of its members, inevitably exposed Tom to the intellectual challenges and debate of the day and in particular Darwin's work, which he greatly admired. His chronic illness forced him to spend much of his life in private study and experimentation at home – when he wasn't travelling the world in a fruitless search for a cure. By his mid-teens Tom had proved himself to be a skilful draughtsman, having had lessons in perspective from the painter George Stubbs, but his great passion, from the start, was the study of gases, acids and metals and their chemical interaction with heat and light. He was encouraged in this by his father's chemical assistant, Alexander Chisholm, at the family home, Etruria Hall near Stoke-on-Trent. The firm of Wedgwood had already been using the camera obscura to draw country scenes from which transfers onto Wedgwood pottery products could be made and young Tom might have played a major role in the burgeoning family business, had his health not prevented him; but in 1793 he left the firm to concentrate on his scientific interests.

In the years that followed, Tom Wedgewood's slide into physical exhaustion was triggered by his obsessive bouts of experimentation, combined with headaches and depression. It led, in the end, to nervous breakdown and ultimate opium

addiction – a result of the large doses prescribed for him by Darwin. It blighted the tall, fine-looking Wedgwood's active and personal life, but it never dimmed his love of science and with it came the first tentative steps towards making photographic images on paper. Back in 1792, Joseph Priestley had spotted the twenty-two-year-old's potential when Tom had published a paper on his experiments with phosphorescence. Priestley wrote to him that year, telling him of the exciting path of scientific discovery out there, waiting for young men such as him. 'There is nothing more within the field of random speculation, and less within that of experiment, than the subject of *light* and *heat*,' wrote Priestley, adding prophetically, 'this I hope is a business reserved for you. It is ground unoccupied.'[3]

Tom Wedgwood had of course studied Newton's *Opticks* and was well versed in the latest scientific thinking on the subject of light. In his early experiments in the as yet unoccupied ground of photography some time in the 1790s he had worked with the dim old camera obscuras of the day. But he was frustrated to find that none of the exposure times he had used had been long enough to produce an image on his chemically treated material, because the light levels inside the camera were just too low. By the end of that decade, when his bouts of illness allowed, he once more attempted to find ways of creating images chemically, this time by contact exposure. What Wedgwood eventually achieved – though simple – were 'silver pictures', as Lunar Man James Watt described them, although they were later sometimes referred to as 'photograms' or 'shadowgrams'. He achieved them by applying a mixture of silver nitrate dissolved in water to pieces of paper and then exposing the paper to the light with small flat objects – such as leaves or insects' wings – laid on their surface. He also tried using pieces of white chamois leather as the medium, which proved more successful. The leather readily soaked up the

silver nitrate solution and it is possible that the ingredients used in tanning, such as galls and salts, that were already present in it reacted with the silver nitrate, giving a faster and more successful response.

But in all cases, the minute the images revealed themselves there in front of him, they began to darken dramatically if left out in the daylight. The same thing happened when Tom tried placing a semi-transparent silhouette of a picture painted on glass upon sensitized paper and exposed it to the light. All too briefly the image emerged only to begin once more to disappear if not immediately removed from the light. He was therefore able to show the images he had achieved to his friends only at night by candlelight, which would not be bright enough to change them. But shadowgrams such as this, which could only be viewed in the dark, were of little use; they did, nevertheless, survive, albeit in an ever-diminishing state, much longer than expected. Although they are now lost to us, these first tentative images were seen as late as 1885 by the chemist, Samuel Highly, who during his researches noted that he had been 'looking at specimens of some of Wedgwood's experiments with chloride of silver on bibulous paper' – probably held by a private collector.[4]

It is possible that during a brief period of remission in his illness after 1799 Tom Wedgwood went back to photographic experimentation in earnest. Some time between March and May 1802, when he was in London consulting with his doctor, he was able to recreate his experiments at the well-equipped basement laboratory of the Royal Institution, in collaboration with his friend and colleague Humphry Davy, who was a professor of chemistry there.[5] In his own experiments on heat and light in 1797, inspired by the work of the French nobleman and outstanding experimental chemist Antoine-Laurent de Lavoisier, Davy himself had concluded that light and not heat

was 'the important imponderable'. 'What we mean by nature is a series of *visible images*,' wrote Davy in his notebook, 'but these are constituted by light. Hence the worshipper of Nature is a worshipper of light.'[6]

To Wedgwood and Davy those fragile images produced in the laboratory at the Royal Institution in 1802 were miraculous little creations. But they were ephemeral: both men knew that in their current state they were doomed to be destroyed by the very thing that had created them – light. Davy had already tried and failed to preserve images of small objects projected by a solar microscope rather than the camera obscura. But like Wedgwood – and despite being a brilliant chemist – he had not been able to fix them. All that was wanting, in Davy's view, was a 'method of preventing the unshaded part of the delineations from being coloured by exposure to the day'. Once achieved, this would 'render the process as useful as it is elegant'.[7] But it was an intensely frustrating admission to have to make. There was just this one last piece of the puzzle remaining to be solved, but for decades no one would be able to crack it.

Although Tom Wedgwood's first tenuous experiments ended where they began, as they did for so many other precursors in the art of photography – in frustration and disappointment – yet in preparing his paper with the magical silver nitrate (known as lunar caustic by the ancient alchemists who believed that silver was associated with the moon), he had laid down the important germ of an idea.

This brief window of scientific discovery was the last enjoyed by Tom Wedgwood. His urgent need to write up his embryonic photographic 'speculations' was all too quickly curtailed by the inevitable slide back into illness, his senses dulled by the powerful opiates on which he had become dependent, and which he had shared with his close friend, the poet Samuel

Taylor Coleridge. It was Davy, therefore, who later that same year wrote up a rather dry and cursory 'Account of a method of copying paintings upon Glass and of making Profiles by the agency of Light upon Nitrate of Silver' – the first photographic experiments of their kind to be published.[8]

The final three years of Tom Wedgwood's tragically 'maimed life' were blighted by mounting hypochondria and a consuming fear of losing the powers of reason by which he had lived – the terror of dying insane or paralysed.[9] He died in 1805 at the age of twenty-seven. The loss of his talent was deeply mourned by Coleridge, who recorded that his friend had 'added a fine and ever-wakeful sense of beauty to the most patient accuracy in experimental philosophy' and had 'united all the play and spring of fancy with the subtlest discrimination and an inexorable judgment'.[10]

Despite that, in Wedgwood's legacy – the five pages of Davy's published account – lay many of the basic building blocks from which photography would eventually emerge. The first step – using light to initiate a chemical change – had been found by Wedgwood, but without the second step of halting that change at the right moment and freezing the image in time, photography would remain a dream.

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Humphry Davy chose not to continue the experiments he had begun with Wedgwood. Discouraged by the problem of fixing the images, he lost interest and instead went back to his many and far more successful experiments in agricultural chemistry and electricity. Tom Wedgwood's little-known but pioneering work was quickly and totally forgotten.

Science, it would seem, had reached an insurmountable stumbling block – that of making the longed-for leap in harnessing the natural elements of light in conjunction with

chemicals to make images and fix them for ever. The possibility of capturing the light continued, however, to tantalize, promising the obvious laurels of precedence, wealth and fame to whoever got there first. But it would require a more physically vigorous personality in the uncertain but thrusting years of the new century, who in France would pave the way for a totally new approach to this challenge.

Chapter Three

THE BOX OF WONDERS

During Tom Wedgwood's childhood and the years of his first attempts at photographic experimentation in the 1790s, France had been going through the dramatic upheavals of revolution. Scientific enquiry had been flourishing there, although in general it had been restricted to the elite, educated classes rather than percolating down into industry and manufacturing, as it had done in England. In France, science remained predominantly theoretical rather than applied. All this, however, was summarily sidelined by political conflict and economic downturn, and many outstanding French men of science and letters fell victim to the inquisition that was the Jacobin Reign of Terror. The exploits of the Montgolfier brothers in pioneering manned flight with their hot-air balloons were dramatically curtailed, as too was the work of the chemist Lavoisier, whose experiments with hydrogen tapped directly into the balloonists' work with gases. In the late eighteenth century Lavoisier had played a pivotal role in turning the experimental tide away from the dark practices of alchemy towards the new science of chemistry, but he had perished on the guillotine in the Place de la Révolution in May 1794 on trumped-up charges, the new French republic declaring that it had no need of intellectuals such as he. But as his colleague the mathematician Joseph-Louis Lagrange – who had mercifully escaped the same

fate – had observed: 'It took them only a moment to cause that head to fall, and a hundred years, perhaps, will not suffice to produce another like it.'[1]

Revolutionary protest in France had initially been prompted by the indifference of the Bourbon monarchy to the economic crisis that was crippling the French countryside. Years of seclusion at their palace at Versailles had isolated King Louis XVI and his wife Marie Antoinette from the poverty endured by the common people, oppressed as they were by centuries of an outmoded taxation system that had bled them dry. Government coffers meanwhile had been drained by costly wars in Europe and financial support for the American Revolution. Three hundred years of an absolutist monarchy had, without compunction, favoured an acquisitive aristocracy and clergy – neither of whom paid taxes and who profited from the labour of the ruthlessly exploited Third Estate – the peasantry. The rural population was suffering hunger and deprivation as the old feudal system disintegrated; revolution now seemed inevitable. Nevertheless, King Louis XVI and his wife continued to indulge their sybaritic lifestyle indifferent to the widespread hardship in the French countryside, as drought and a succession of hard winters took their devastating toll on harvests and forced up bread prices. With the French national deficit reaching crippling levels (something approaching £800 million in today's values), the army of bureaucrats who supported the centralized, despotic rule of the Bourbons and who worked in the safe sinecures of government offices were daily feeling the rising anger of their fellow citizens.

Among those civil servants was Louis Jacques Daguerre, who held the lowly post of crier at the local bailiwick's court in Cormeilles-en-Parisis, a small town in the *département* of Seine-et-Oise, about ten miles north of Paris. Louis was a young husband when, on 18 November 1787, with France on the

brink of bankruptcy and martial law declared in Paris, his wife Anne Antoinette gave birth to their first child, a son, christened Louis Jacques Mandé Daguerre. Their baby was only eighteen months old when revolutionary forces stormed the Bastille in Paris in July 1789, unleashing a decade of fear and turmoil across France.

By the end of 1791, the local French courts where Louis Daguerre worked had been crushed by the revolutionaries, who had forced King Louis into an uneasy constitutional monarchy that within a year had collapsed. With the demise of the old legislative system, Daguerre senior found himself out of a job. His loyalty to the monarchy, however, had held him in good stead and he quickly found a post as a clerk at one of the wealthiest royal estates, near Orléans, eighty-one miles south-west of Paris. His privately held sentiments were confirmed by the name he gave to his new daughter, born in 1791, who was christened Marie Antoinette Daguerre. But in January 1793 Louis XVI, who had been arrested after trying to flee France, died on the guillotine; he was followed in October by his wife. As the legalized Reign of Terror took hold the worst of the violence and excesses of the French Revolution, and with it the systematic murder of the aristocracy, was confined mostly to Paris. Daguerre's employer, Louis Philippe II, Duc d'Orléans, although a cousin to King Louis, had long been a liberal and had come out as a Jacobin sympathizer, adopting the sobriquet Philippe Citoyen Égalité in support of the Revolution. For a few months the region where the Daguerre family lived seemed safe. But the revolution inevitably caught up with the duc. As a member of the hated House of Bourbon he was eventually arrested and was tried and summarily guillotined on 6 November 1793.

The news of the duc's execution inevitably cast a pall over

his estates at Orléans and those who worked there, but otherwise daily life carried on much as usual. For the young and inquisitive Louis Daguerre was now beginning to explore what a thriving regional centre such as Orléans had to offer. Paris may have had the finest theatres, a grand opera house and world-class musicians, but popular entertainment of a different order made regular appearances in French towns like Orléans, particularly on market days and during religious festivals such as the carnival in the weeks leading up to Lent. Public occasions such as this provided a far more immediate and visceral kind of street entertainment for ordinary people. Often of a crude or bawdy nature, it catered to the short attention span of its audience, as people moved from one market stall to the next. The knockabout, stylized violence of the enduringly popular puppet show 'Polichinelle et Joan' – the French version of Punch and Judy, a show that had originated in Italian *commedia dell'arte* in the fourteenth century – was complemented by the tomfoolery of colourfully costumed jugglers, the breathtaking antics of acrobats and a wealth of other street performers. All of them sought out ever more dramatic and eye-catching performances that would win a few sous, tossed from their pockets, as the crowds passed by.

These short excursions into fairytale and fantasy, even when clothed in tired and tawdry costumes and performed on improvised stage sets that had seen better days, were common sights in places like Orléans when Louis Daguerre was a child. Their magic appealed to his developing imagination, for from his youth he demonstrated an artist's sensibility and was an acute observer of the world around him. On festival days and market days, when itinerant performers would haggle for prime positions on street corners where they could set up their stalls and small marquees, boys like Louis with a coin or two in their

pocket to spend would have weighed up the relative merits of what was on offer before putting their money down and entering into the world of wonders offered up to them.

In his childhood, there was one popular entertainment above all others that must, from the first, have captured Louis's imagination: the magic lantern peep show. An age-old form of entertainment, lost to us now, but very common in Europe from the Renaissance, it fell somewhere between portable puppet theatres and the penny-arcade stereoscopic peep shows of the later nineteenth century. Chinese shadow-play – or *ombres chinoises* – using jointed paper puppets fastened to pegs, had been all the rage in Paris in the 1770s and at the royal court at Versailles after being brought back from the Far East by French missionaries. But this form of entertainment reached a far wider audience in its cruder form, as the itinerant peep show of the late eighteenth and early nineteenth centuries. The peep-show operator could travel the provinces and set himself up on any street corner, much like the jugglers and acrobats who haunted provincial markets and fairs, but with the difference that his show was not open to view, but was contained inside a simple wooden box, usually the size of a tea chest with the largest being about three foot square fixed at the top of folding legs. The box was gaily painted, with a peep hole in the front, often with a magnifying glass in it, and was not too different in appearance from the already familiar camera obscura of old. Publication in 1558 of Giovanni Battista della Porta's *Magiæ Naturalis* had long since taken the camera obscura into the realms of popular entertainment, as the means of creating natural magic through the peep shows, although it continued to be used by artists and draughtsmen.

At travelling fairs in the late eighteenth and early nineteenth centuries, the curious would step up and pay their money to peer inside – usually one at a time, though some of

the more sophisticated travelling peep shows had more than one peep hole. The operator would then begin telling his story for everyone gathered around him to hear, animating it by means of a few strings or pulleys that protruded from the side. But only those who had paid their money could see what was happening, mysteriously, inside that simple wooden box. What their eyes focused on through the peep hole was a miniature theatre with a proscenium arch and rich scenic decorations, far more intricate than anything that those living in the provinces had seen or would ever see in their lives and of the kind most people had only ever heard about in stories. The players in the peep-show story contained inside the box were, of course, nothing more than paper cut-outs and their action consisted of simply being moved back and forth across the stage in front of changing scenery. But if the operator who pulled the strings could spin a good story and if the interior of the box was well decorated and his show went smoothly, what in effect the viewer saw was a form of silent cinema in its earliest, crudest incarnation. The more sensational and scary the peep show was, the more popular, for it created in miniature a world of the supernatural and fantasy that had been thrilling post-Revolutionary Paris for several years.

The larger, theatre-based incarnation of the magic lantern show had premiered in Paris as the *fantasmagorie* – phantasmagoria – at the Pavillon de l'Échiquer in January 1798 to overnight success. It was the creation of the Belgian Étienne-Gaspard Robertson – a trained physicist and amateur painter. By a clever combination of optics and skilfully hand-painted slides, Robertson drew on the then popular genres of fantasy, horror and melodrama by conjuring up every kind of ghostly apparition, spectre and clanking skeleton, making them fly through the air and spring out at his unsuspecting audience from the smoky backdrop onto which they were projected. He

had cleverly chosen to stage his shows at 7 p.m. every evening in the appropriately Gothic setting of the Cour des Capucines, off the Place Vendôme. The location was a ruined convent which reeked of the must and chill of ages and where terror lurked in the shadows as dusk fell and his audience took their seats in an auditorium draped in black and as dark as the sepulchre. The terrifying effects of Robertson's apparitions – 'spirits, ghosts and every species of optical delusion'– were enhanced by the magic lantern projector being rolled backwards and forwards behind a large semi-transparent screen, thus zooming in and out of the images much like film camera techniques today.[2] By using several projectors at the same time Robertson could even make his array of ghosts, goblins and banshees appear to be passing through solid objects; his assistants added to the terror inspired in his paying customers by creating a live soundtrack of disembodied voices, weird musical sounds and shrieks and howls.

Robertson took great delight in the realistic effects of his newly patented 'Fantascope': 'I am only satisfied if my spectators, shivering and shuddering, raise their hands or cover their eyes out of fear of ghosts and devils dashing towards them; if even the most indiscreet among them run into the arms of a skeleton,' he declared.[3] The subjects he chose to present – such as the decapitated heads of French revolutionaries Danton and Robespierre – were often perilously close for comfort, reviving memories of the all too recent real-life tumbrels and guillotines of the city during the Jacobin Terror. Other stories ranged from recreations of Shakespeare's more macabre characters such as Macbeth, through biblical stories, to representations of figures from literature such as Voltaire and Rousseau. With the turn of the century and the rise of Napoleon, scenes of his triumphs in war would later become increasingly popular at phantasmagoria shows.

Travelling practitioners of the kind seen at the market place in Orléans by the young Daguerre were, by comparison, very limited in the effects they could create, relying in the main on the flair of the operator's lurid storytelling, with the help of sound effects created by an assistant, if he could afford to have one. But, primitive though they were, the peep show and the phantasmagoria had all the attraction for impressionable teenagers of today's cult vampire movies and the influence of the genre's artistry and showmanship, as well as its experimentation with optical illusion, is very clear in Daguerre's career, once he made the transition from rural France to the capital.

Young Louis Daguerre had been fortunate, despite the revolutionary times in which he lived, to grow up under the care and tutelage of loving parents. Although the riots and devastation seen in Paris did not reach Orléans, the impact of the Revolution was felt throughout France in the number of young men who were conscripted into the military by the various revolutionary governments that followed the execution of the king. By the 1800s, men were increasingly being called up to take part in military campaigns, first in Italy, and then, with the inexorable rise of Napoleon Bonaparte, throughout much of Western Europe. Particularly notable was the enforced conscription of large numbers of schoolteachers, leaving few behind to educate the young. Daguerre suffered as a result; he was sent to the *école publique* in Orléans, but, like most schools in France at the time, it is unlikely that it met regularly and his education would have been intermittent at best. The poor education he received may, in the long run, have done him a favour by saving him from becoming a clerk or some other small-town functionary similar to his father. It forced him to exploit the natural artistic gifts he was already displaying, for, from a very young age, he had attracted attention and praise for his ability to execute incredibly lifelike drawings, much to

the pride of his parents. Like any other draughtsman of his day, Daguerre was already more than familiar with the uses of the camera obscura, but in the years to come he would be inspired to use it in a new and dramatically different, theatrical way.