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Article abstract

In the mid-nineteenth century photographers were challenged by the absence of light in indoor and underground spaces. One promising solution was the intense light created by the combustion of magnesium, which became commercially available in England in 1864. This article examines the use of magnesium wire by the pioneer Canadian photographer Charles Smeaton, who took the first pictures in the Roman catacombs in the winter of 1866-1867.

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Abstract: *In the mid-nineteenth century photographers were challenged by the absence of light in indoor and underground spaces. One promising solution was the intense light created by the combustion of magnesium, which became commercially available in England in 1864. This article examines the use of magnesium wire by the pioneer Canadian photographer Charles Smeaton, who took the first pictures in the Roman catacombs in the winter of 1866-1867.*

Résumé : *Au milieu du XIXe siècle, les photographes ont été confrontés à l'absence de lumière dans les espaces intérieurs et souterrains. Une solution prometteuse a été la lumière intense créée par la combustion du magnésium, une méthode qui a été commercialisée en Angleterre, en 1864. Cet article examine l'utilisation du fil de magnésium par Charles Smeaton, photographe canadien visionnaire, qui a pris les premières photos des catacombes romaines au cours de l'hiver 1866-1867.*

Keywords: Catacombs, Charles Smeaton, Magnesium, Flash Photography, Rome

In the twentieth century, extensive photographic documentation of the Roman catacombs was undertaken by the Pontificia Commissione di Archeologia Sacra, the body now charged with their care and maintenance. But the honour of having taken the first pictures in those "dismal dungeons," as he called them, goes to a young Canadian photographer from Quebec City, Charles Smeaton (1838-1868) (Fig. 1). In 1866, Smeaton was engaged by the noted Oxford publisher and antiquarian, John Henry Parker (1806-1884), to take photographs of the antiquities of Rome, with a particular focus on the mural decorations in the catacombs, the underground cemeteries situated outside the city's walls. The complete absence of any natural illumination had hitherto stymied Parker's Italian photographers, but Smeaton proposed an ingenious solution: the use of magnesium wire, a recent and still very expensive invention, but one which had become commercially available in Britain in 1864. Accordingly, he accompanied Parker to Rome in the autumn of 1866 and remained there until his death from malaria in March 1868. This study situates these pioneering experiments, with what Smeaton described as "coils of sunshine," at the intersection of the histories of archaeology and photography. His work with magnesium wire to enable photography in the subterranean spaces of the catacombs warrants a prominent place in the history of science and technology in Canada.[1]

The challenge that had stymied Parker's previous efforts at underground photography was not a new one. From the advent of the medium and its first demonstrations by Louis Daguerre (1787-1851) in Paris in 1839, photographers had been engaged in a continual battle against the enemy of inadequate light. Low light levels, slow emul-

 John Osborne, "'Coils of sunshine': Charles Smeaton's Magnesium-Wire Photography in the Catacombs of Rome, 1866-1867," *Scientia Canadensis* 44, no. 1 (2022): 1-18.

Figure 1. *John Batemann (Canterbury, UK), Photographic portrait of Charles Smeaton, 1866. Smeaton family archive, Toronto.*

battle against the enemy of inadequate light. Low light levels, slow emulsions, and lengthy exposure times created a dependence on the vagaries of weather, with the result that photographic studios were frequently located on an upper floor, in spaces provided with large windows and skylights, in order to take the maximum advantage of natural sunlight. When the itinerant American duo G. W. Halsey and Henry Sadd opened the first daguerreotype studio in Quebec City in October 1840, above John Grace's confectionary store on Rue Saint-Joseph, they invited interested readers of *The Quebec Mercury* to visit and inspect their equipment, but they noted that this could happen "on sunshine days only," advising that the production of images required exposures of up to four minutes.[2] Their enterprise was short-lived, and when they returned to New York the following month the same newspaper reported that: "Tired of waiting for sunny days, the proprietors of the Daguerreotype have left this city for 'warmer regions and a clearer sky.' The last week has been particularly unfavourable to the operation of their apparatus."[3] Despite the use of head and neck braces, those posing for portraits could only be expected to remain motionless for a limited time. Daguerreotypes featuring immobile subjects, for example outdoor views of buildings, monuments, and landscapes, were in many ways easier to produce. This situation was much improved by new technical processes in subsequent years. The invention of the calotype (by William Henry Fox Talbot (1800-1877)[4] and the "wet collodion" process a decade later by Frederick Scott Archer (1813-1857)[5] reduced exposure times; but an adequate supply of light remained an issue, particularly for indoor and underground spaces.

John Henry Parker

Finding a solution to the issue of artificial lighting was of particular concern to John Henry Parker, an amateur but deeply knowledgeable scholar of architecture, who from 1870 was the Keeper of Oxford's Ashmolean Museum. Following a bout of rheumatic fever, apparently contracted while studying Windsor Castle, Parker was advised by his physicians to spend his winters in warmer climes. After a first unsatisfactory sojourn on the French Riviera, he chose to do so in Rome, where he devoted his time and energy to the study of the city's ancient and medieval monuments. In 1865, Parker helped to found the British and American Archaeological Society, serving as its vice-president.

It was Parker's belief that many unresolved historical questions, and in particular debates regarding issues of chronology, could be resolved most effectively through the study of archaeology, and furthermore that photography offered the ideal means to

provide the necessary scientific documentation.[6] Engraved drawings could be manipulated or distorted by the artist who drew them, whether consciously or unconsciously, but photographs did not lie. Beginning in 1864, Parker commissioned local photographers in Rome to produce images of both standing buildings and excavated remains. In the intervening summers he exhibited and sold prints made from the glass negatives in London, while also delivering lectures to various academic societies in Britain on the value of the evidence the images provided. Parker numbered each photograph in consecutive sequence, and all were listed in a series of cumulative sale catalogues, first published in 1867,[7] with updated supplements appearing at regular intervals thereafter. Parker's principal concern was the detailed observation of very specific artistic and architectural techniques, for example the width of mortar beds between courses of brickwork, and this is reflected in the subjects selected to be photographed. As he stated in the introduction to his first catalogue, "the sort of minute accuracy which such a work requires could only be obtained by means of photographs."[8] A selection of these images would later form the basis for a series of thirteen volumes published as *The Archaeology of Rome*.[9]

Parker's photograph collection eventually grew to almost 3,400 collodion glass plates, most of which were destroyed in the fire that ravaged Rome's Palazzo Negroni Caffarelli in July 1893. A few hundred are preserved today in the collections of the American Academy in Rome and the Istituto Centrale per il Catalogo e la Documentazione (ICCD). Fortunately, there are also a number of complete, or near complete, collections of prints, made from the negatives before they perished, and these survive in various Roman archives (Museo di Roma, British School at Rome, German Archaeological Institute) as well as at Oxford (Bodleian Library and Ashmolean Museum) and Ann Arbor, Michigan (Kelsey Museum of Archaeology).[10] The late twentieth century witnessed a series of exhibitions of the Parker photographs in Rome, Berlin, and Ann Arbor, aimed at bringing knowledge of the collection to a wider audience.[11]

Among Parker's very specific interests were Rome's underground cemeteries, known popularly and collectively as the catacombs. These dated from the era of Late Antiquity, and by the provision of the Law of the Twelve Tables (ca. 450 BCE) were situated outside the circuit of the city's walls, most recently those constructed by the Emperor Aurelian circa 271-275 CE. The networks of passages and small rooms (*cubicula*), carved into the soft volcanic earth (*tufa*) and hardened after exposure to air, had been used for burials from roughly the end of the second century CE, when Roman funerary practice shifted from cremation to inhumation, through to the middle of the fifth century. In particular, Parker challenged the customary dating of the painted mural decorations in the catacombs to the period of early Christianity. He believed that this chronology was some centuries too early, and that the wall-paintings should more accurately be assigned to the eighth or ninth century when the suburban cemeteries had gained new importance as sites of religious pilgrimage and many are recorded as having been restored for that purpose.[12] This claim is now known to be inaccurate. A very small handful of catacomb murals are indeed of medieval date, related to the new function of these spaces as destinations for the pious visitors who were flocking to the city in increasing numbers in order to venerate the tombs of the saints. Unsurprisingly, these later murals would be singled out by Parker for photography; but the vast majority belong to an

earlier period, when the cemeteries exercised their original function as sites of burial, and their subject matter reflects the faith of the deceased and their belief in an afterlife to follow. Most of the catacomb paintings are Christian in nature, illustrating Biblical themes, although the cemeteries were also used by other religious faiths that practised inhumation, including Rome's Jewish community.

In the autumn of 1864, when Parker first arrived in Rome, interest in the catacombs was running high, prompted principally by a campaign undertaken by Giovanni Battista de Rossi (1822-1894) to rediscover and identify the long-abandoned and mostly forgotten cemeteries, and to document them scientifically. In that same year, De Rossi published the first volume of his major work on the subject of "underground Rome," *La Roma Sotterranea Cristiana*,[13] and new discoveries were being reported regularly in the pages of his academic journal, the *Bullettino di Archeologia Cristiana*.[14] These publications were illustrated with engravings, based on drawings, as the production of photographs in underground spaces totally devoid of natural light had hitherto proven to be an insuperable challenge for Roman photographers. For the same reason, the earliest photographs of catacomb paintings offered in Parker's sale catalogues were copies taken from engravings included in a recent publication, Louis Perret's *Catacombes de Rome*, and are thus described in his catalogue as "from Perret."[15]

As Parker himself would later explain, his lighting problem was solved in the winter of 1866-1867 by Charles Smeaton, "a very clever Canadian photographer, whom I had taken from London for that purpose—with the help of the light of magnesium. All the Roman photographers had told Cardinal Antonelli that it was impossible to take photographs in the catacombs."[16] The first evidence for successful photography comes from the catalogue entry for the Parker image numbered 561 (Fig. 2). This specifies that the mural image of a peacock in the Jewish catacomb of the Vigna Randanini, a cemetery situated to the south of the city on the Via Appia Antica, had been taken "from the original Fresco,"[17] thus offering the on-the-spot veracity that Parker avidly sought. First rediscovered in 1859, and excavated in the early 1860s, the Vigna Randanini site was probably chosen as the starting point for photographic experiments due to its easy accessibility. The sparse paintings are mostly non-figural and evoke an otherworldly setting, primarily depicting floral motifs and birds, as well as the occasional Jewish symbol. We can surmise that this cemetery was not considered to be important by De Rossi and his colleagues, who had in fact declined a proposal to acquire the land in question for the Roman church. Fortunately for Parker, this meant that official papal permission was not required to enter the underground space, nor to take photographs. The owners of the property, the Randanini family, attempted to promote the site for tourism, and even advertised their willingness to sell any excavated finds to the general public.[18]

Other catacomb images would follow in rapid succession: from the Catacombs of Pontianus (Parker 607-611), Priscilla (Parker 612-613), Praetextatus (Parker 614-617), Domitilla (Parker 618-621), the *Coemeterium maius* (Parker 626-628), and St Hermes (Parker 629).[19] Although it was not Parker's usual practice to identify his photographers by name, in addition to his comments published elsewhere, the prints of fifteen of these catacomb views are in fact signed "Smeaton phot." (609, 611-619, 621, 626-628)

Figure 2. *Charles Smeaton, Peacock, Catacomb of the Vigna Randanini, Rome (1866/7. BSR Photographic Archive, John Henry Parker collection, JHP-0561.*

(Fig. 3) or simply "Smeaton" (629). These notations would have been produced by painting a signature on the original glass plate. A subsequent version of Parker's catalogue added a note regarding the new technique: "The Fresco Paintings in the Catacombs *are taken with the magnesian light*, which has an appearance similar to moonlight."[20]

Charles Smeaton

The precise circumstances of Charles Smeaton's first encounter with John Henry Parker are not recorded, although we can surmise that their meeting took place in London in the summer or autumn of 1866. Smeaton was born in Perthshire, Scotland, on 5 April 1838, and as a young boy emigrated with his family to Canada, arriving in May 1842. His father, Alexander, settled in Quebec City where he opened a tailoring business that flourished following some initial financial setbacks. Charles had considerable artistic talent, and by the time he reached his late teens he was making a name for himself as a painter. Contemporary newspaper accounts single out for acclaim his imagined portraits of the Scottish poet Robbie Burns and of Henry Wadsworth Longfellow's fictional Acadian heroine, Evangeline.[21] Smeaton had also developed a passion for the new art of photography, and this soon became his primary interest. In the summer of 1861, Charles and his younger brother John took over the family business premises on Quebec City's Côte du Palais, opening "Smeaton's Photographic Gallery." Advertisements appeared in the *Quebec Mercury* newspaper and elsewhere.[22] A half-page "card" in *The Grand Trunk Railway Gazetteer* notified readers of the broad range of photographic services on offer:

> Photographs from full length life size to the smallest miniature, Plain or Colored in Oil or Water Colors. Cartes de visite, Ivorytypes, Lettergraphs, and every other style of the art, done in the very best manner, and on the shortest notice. Coloring particularly attended to, one of the partners being an artist. Always on hand a collection of views of Quebec and surrounding scenery.[23]

The new enterprise proved a success, and a number of Smeaton portraits of individuals and groups, as well as views of buildings and monuments in Quebec City, and landscape views, all bearing the "Smeatons Photographic Gallery, Palace Street, Quebec" stamp on their reverse. These photographs survive today in several collections of historic photographs, most notably those of Library and Archives Canada (Ottawa), the Musée national des beaux-arts du Québec (Quebec City), and the McCord Museum (Montreal). Prominent individuals who posed for Smeaton's camera included George Jehoshaphat Mountain, the Anglican bishop of Quebec and founder of Bishop's University in Lennoxville, and Samuel Leonard Tilley, premier of New Brunswick, who came to the city for the October 1864 Quebec Conference, held to discuss the possibility of uniting the various British colonies in North America. Under the heading "A Good Picture," the Tilley image was described by the *Morning Chronicle, and Commercial and Shipping Gazette* as "a capital likeness, and a most creditable specimen of skill in the beautiful art of photography."[24]

There were many photographers active in Quebec City in the early 1860s, but Smeaton's attempted to differentiate itself from competitors through creative and innovative practices designed to attract public attention and establish a regular clientele. Local newspapers at the time recorded that a number of prominent social events—from sponsored skating parties to the presentation of a new set of bagpipes to the Highland Rifle Company—were captured for posterity in Smeaton photographs.[25] These constitute a unique pictorial record of life in the city in the years immediately prior to Canadian confederation. Similarly, while every photographer offered views of the city and its surroundings, the forerunners of modern postcards, Smeaton was successful in

Figure 3. Charles Smeaton, Entrance to the Catacomb of Pontianus, Rome (1867).
BSR Photographic Archive, John Henry Parker collection, JHP-0611.

combining multiple impressions to produce prints displaying large panoramic vistas, something that led to accolades in the local press.[26]

Why and precisely when Charles Smeaton went to London is not known, but it may have happened in the spring or summer of 1866. There he met Parker, with whom he apparently discussed the problem posed by the absence of natural light. Smeaton suggested the use of magnesium wire, and there is circumstantial evidence to suggest that he even arranged a demonstration. Twenty years earlier, Parker's Oxford publishing company had collaboratively produced a book by Robert Willis on the architecture of Canterbury Cathedral that established a new standard for the very precise observation and recording of architectural details. Willis's book had not been illustrated, however, and Parker was determined to print a volume of photographic images to supplement the earlier text. This was accomplished, and the volume, which appeared in 1867, includes a number of photographs taken in the undercroft and other subterranean spaces of the cathedral, for example one detailing the twelfth-century wall-painting in which Christ is shown seated in a mandorla.[27] It is not possible that this photograph, taken below ground in the apse of the St Gabriel chapel, could have been taken without the aid of artificial lighting, although no mention is made by Parker of the specific circumstances, nor does he name the photographer. His supplement has no actual text, only 26 photographs with identifying captions.

While Parker's published photographs of Canterbury were not signed, numerous clues point towards Charles Smeaton's involvement. The title page of the 1867 supplement bears the printed notation "for private circulation only," and the number of copies seems to have been limited. Only four are recorded today in public-library collections.[28] Dismembered pages from a fifth copy, unfortunately incomplete, are preserved in the Smeaton family archive, highly suggestive of a personal connection. Significantly, the family archive contains unpublished views of Canterbury Cathedral and its precinct, including an almost identical image of the apse of the St Gabriel chapel taken from a slightly different angle.

There can be no doubt that Smeaton was himself present in Canterbury. He had a penchant for including his own image in photographs, and he appears in a view of the base of the cathedral's Water Tower, constructed by Prior Wibert in the 1160s (Fig. 4). And while in Canterbury, Smeaton also had his own portrait photograph taken by a prominent local photographer, John Batemann (Fig. 1). What can be said with absolute certainty is that Charles Smeaton joined Parker in Rome in the winter of 1866-67, and a memoir written in his own hand documents his photographic undertakings in the Catacomb of Priscilla on the Via Salaria in January 1867.

Magnesium Light

Various early photographers had attempted to find practical alternatives to natural sunshine that would allow them to work in poorly lit spaces. Brief flashes were certainly possible,[29] but creating the intense and consistent lighting required for lengthy exposures in spaces devoid of natural light proved to be much more elusive. By the late 1850s, a number of photographers were experimenting with various chemical substances, including magnesium, an element first isolated by Sir Humphry Davy in 1808. In October

Figure 4. Unknown photographer, Charles Smeaton at Canterbury Cathedral, Canterbury, England, 1866. Gift of W. James Smeaton, M2019.7.2.2.10 © McCord Museum

1859, the editor of London's *The Photographic News*, William Crookes, responding to a reader's query regarding how one might take photographs underground in Kentucky's Mammoth Cave, suggested burning phosphorus, but then added:

> A still more brilliant light, but a terribly expensive one, can be obtained by burning the new metal, magnesium, in oxygen. We have, for some time past, been experimenting on this subject, and hope shortly to be able to publish our results. A piece of magnesium wire, held by one end in the hand, may be lighted at the other extremity by holding it to a candle, as if it were a wax taper. It then burns away of its own accord, evolving a light insupportably brilliant to the unprotected eye, and possessing powerful actinic properties.[30]

Just over a year later, Crookes returned to this topic, discussing the experiments of the German chemist Robert Bunsen and outlining a possible procedure for the production of magnesium wire:

> From the researches of the first-named chemist [Robert Bunsen] it is known that when magnesium is ignited it readily takes fire and burns with an exceedingly brilliant flame. … In order to support this light during one minute a piece of wire 39 inches long, weighing 1.85 grains, was required. … Magnesium wire is readily obtained by forcibly pressing the metal through a hot steel die by means of a steel piston. Bunsen's arrangement for burning the wire was made by connecting spools of it with rollers moved by clockwork, so that the wire should be unrolled like the ribbon of paper in Morse's telegraph; the end of the wire thus gradually pushed forward passed into the flame of an ordinary alcohol lamp where it took fire. It is evident that a magnesium lamp of this sort must be simpler and more compendious than any of the existing arrangements... Where an extraordinary amount of light is needed it could readily be produced by burning large wires, or several thin ones at the same time. Another important consideration is the fact that the spool of wire as well as the clockwork and spirit lamp are easily transportable. It is not, however, to the intensity alone of the magnesium flame, that these lamps owe their utility, as the photographical effect of the light is also very great…[It] must therefore be useful in photographing by night or in any dark or subterranean locality; the evenness and remarkable tranquility of the flame especially commending it for this purpose.

The principal drawback, as he went on to observe, was the price. Magnesium was still "a scientific rarity," but Crookes voiced the hope that it might soon be produced commercially.[31]

At more or less the same time across the Channel in France, the photographer Gaspard-Félix Tournachon (1820-1910), known professionally as Nadar, also began to experiment with artificial light. Known initially as an author and intellectual in the Parisian "Bohemian" circle that included artists, musicians, and writers such as Charles Baudelaire, Nadar had become interested in photography only in the mid 1850s, when he opened a studio and exhibited at the 1855 *Exposition universelle*. He soon became known for his distinctive portraits, which focused on the face of the sitter and eschewed both costumes and the usual furnishings or stage-set backdrops, as well as for his innovative attempts to manipulate his negatives prior to printing. Perhaps with sales in mind, Nadar also promoted images taken from unusual viewpoints or in unusual locations: for example, aerial photography, first undertaken in 1858 from a balloon tethered to the Arc de Triomphe. A few years later he would even purchase his own balloon, named *Le Géant*, for this purpose. His experimental efforts to solve the lighting problem led to the invention of a lamp in which powdered magnesium was blown steadily through an open flame, and also, more successfully, an apparatus that employed a series of electrical Bunsen-batteries and mirrors. In 1861 Nadar began to take photographs in the city's underground cemeteries, known as the catacombs. These were ancient gypsum quarries, put to new use as ossuaries around the time of the French Revolution at the end of the eighteenth century. Because of the length of time required for the exposures,

averaging some 18 minutes, mannequins were used instead of actual people to provide a human scale.[32] In 1864-1865 Nadar also produced a series of images taken in the Parisian sewers, a location that had been made famous in Victor Hugo's popular 1862 novel, *Les Misérables*.

It was not long before Crookes' hope was realized. In 1864, in Manchester, Edward Sonstadt founded the Magnesium Metal Company (MMC) to manufacture magnesium wire on a commercial basis. But the process remained expensive at two shillings and sixpence per foot with many feet might be required for a single exposure.[33] In an attempt to generate publicity and promote sales, MMC provided wire free of charge to Manchester photographer Alfred Brothers, who had previously experimented with its use in portrait photography. His image of Professor Henry Roscoe, taken on 22 February 1864, is the first documented example of a portrait taken in this manner.[34] Another experiment was made two weeks later in Edinburgh, on 8 March, at a meeting of the Photographic Society of Scotland. The Society's president, Sir David Brewster, had received a sample from Manchester the previous day, and wrote to William Henry Fox Talbot to urge him to attend. He did, and a double portrait of Brewster and Talbot, taken on that occasion with an exposure time of 42 seconds, was judged to be highly successful.[35]

In January 1865 Brothers produced what is believed to be the first photograph taken underground using light from magnesium wire in the Blue John caverns in Derbyshire. Brothers also invented a lamp device that served to hold and flatten the wire.[36] As he later explained, "In the form of wire the combustion was somewhat uncertain and it was found by the writer that by passing the wire between rollers, or when it was flattened into a thin narrow ribbon, the combustion was more regular and rapid, and in this form the metal has since been generally used."[37]

The 1867 Universal Exhibition, held in Paris, presented an opportunity to display recent developments in photography and photographic equipment and processes, and a number of participants took advantage of the occasion to demonstrate the potential of magnesium wire or ribbon. In a report on the event prepared for the British government, Hugh Diamond commented:

> The newly-discovered metal, magnesium, by the brilliancy and whiteness of its combustion resembling sunlight, has enabled photographers to secure pictures in vaults and other places inaccessible to ordinary light. … In order to ensure its steady combustion, lamps have been contrived to secure the gradual supply of a ribbon or wire of the metal. Mr. Solomon, in England [i.e. the section of the exhibition assigned to British exhibitors], exhibits a very convenient apparatus. The trial before the jurors was perfect. In Austria is a smaller but similar lamp for the same purpose."[38]

The honour of being the first to photograph the interior of an actual historical monument, as opposed to an underground space, is usually assigned to Charles Piazzi Smyth (1819-1900), professor of astronomy at the University of Edinburgh, and from 1846 the Astronomer Royal for Scotland. Piazzi Smyth was also keenly interested in the Egyptian pyramids, with a particular focus on their measurements, and in the early months of 1865 he undertook a visit to Egypt in order to study the Great Pyramid and record all its dimensions, interior and exterior.[39] His intention was to seek numerological significance

in these figures, but the project also had overtly political overtones. In an attempt to discredit the "atheistic" metric system being promoted by France, he contended that the basic unit used by the designers of the pyramids had been divinely divulged to humanity in the time of Noah, and that it remained alive in the British "inch." While his ideas initially gained considerable popularity in Britain, they were eventually discredited. Piazzi Smyth's reputation was further compromised when a series of predicted dates for the end of time all came and went uneventfully. But his images of the passages and chambers inside the Great Pyramid, taken in April 1865 using magnesium supplied by the Magnesium Metal Company mark a milestone in the history of photography for the use of artificial light in the documentation of the interiors of standing remains from antiquity.[40] As Piazzi Smyth himself noted, the photographs allowed him to not only to check details prior to the publication of his numerous texts, but also to address new questions without the necessity of undertaking a return visit:

> The collection has been of invaluable service to me, in keeping up the memory of the scenes; in furthering some examinations which had only been begun when upon the spot; and in commencing others which had not attracted my attention at the time, but yet had their elements pictured with accuracy, in views which had been photographed for some other very different purpose. This is indeed one of the special uses of photography to a scientific traveller.[41]

Parker would have loudly applauded that sentiment.

There is no evidence to suggest that Charles Smeaton had any direct knowledge of Nadar's Parisian experiments, nor is it known when or how he first came to know of the possibilities of magnesium wire. Reports of Piazzi Smyth's activities were widely distributed in print and through lectures to scientific societies, but the news of the new process had reached North America at least a full year before those Egyptian travels. On 27 April 1864, *The Quebec Daily Mercury* published a notice regarding magnesium, noting that fifteen grains of the metal, in the form of wire, would burn for a minute "and not cost more than a few cents." It continued: "At the distance of eight feet from the sitter, the light produces a negative equal to any obtained from sunlight," concluding presciently "Thus opens a new page in photography."[42] Already at this time the Montreal-based photographer William Notman (1826-1891) was experimenting with the ignition of powdered magnesium to create flare effects simulating the light of candles and camp fires.[43] Perhaps his best-known photograph in this regard is the 1866 "Around the Camp Fire," part of his Caribou Hunting series.[44]

On 30 March 1865, the physician and surgeon, chemist, and medical educator Dr. Gilbert Girdwood (1832-1917) presented a lecture on the science of combustion to the Natural History Society of Montreal, which included a brief discussion both of the light created by burning magnesium and its potential application to photography. The talk was accompanied by a number of scientific and practical demonstrations, including one by William Notman, who used this process to create a photographic portrait of George R. Prowse. The full text of Girdwood's lecture appeared two days later in the *Montreal Gazette*, which reported that "This portrait was taken by the magnesium light, and the experiment excited the amusement of the audience."[45] Notman and Smeaton were certainly in contact. Notman had visited Quebec in 1859 to take pictures of the city and its surroundings, and both artists had collaborated in an exhibition held at the

Quebec Stock Exchange in December of that year.[46] Furthermore, Charles Smeaton appears in the list of subscribers to Notman's first publication, *Photographic Selections* (1863), illustrated with original albumen prints hand-tipped onto pre-printed pages.[47]

"Coil upon coil of sunshine"

Charles Smeaton's handwritten and signed account of a January 1867 day spent working with his "coils of sunshine" in the Catacomb of Priscilla is preserved in the Smeaton family archive. The numerous emendations, and the presence of a formal title, suggest that his twenty-page essay, entitled "An Incident in the Catacombs," may have been written with a view towards possible publication, although this seems not to have happened.[48] Regrettably, this memoir provides little information regarding the actual photographic processes employed; but Smeaton does describe carrying his "instruments," chemicals, and "coil upon coil of sunshine in the shape of magnesium wire"; and there is a subsequent reference to his "magnesium lamp." So clearly this was not "flash" photography, but rather the use of lengths of wire to produce extended periods of illumination that permitted long exposures. In a melodramatic fashion typical of the Victorian age, the author recounts his sense of horror at being left alone in the subterranean darkness after his supply of both candles and wire has been exhausted: "That three hours, alone in the catacombs, never can or will be effaced from my memory, until I have sunk into that untroubled sleep which lay upon those by whom I was then surrounded."[49] The playful sense of humour with which he also describes a close encounter with a human skull is echoed in one of his photographs from another cemetery, recording the brickwork at the entrance to the Catacomb of Domitilla, in which Smeaton himself appears shown posing with a skull (Fig. 5).

The Parker collection of photographs functions today exactly as its originator had intended, providing an important and frequently useful record of the state of buildings and monuments in and around Rome, along with details of their construction techniques and their decorations, in the 1860s and 1870s. This documentation is particularly valuable for monuments that no longer exist or that are not currently accessible. One catacomb image in particular stands out in this regard.

Parker was particularly interested in the murals decorating the Catacomb of Pontianus, located to the west of the city, on the hill of Monteverde overlooking Trastevere, since he believed, in this instance correctly, that the murals were for the most part "medieval" as opposed to "Early Christian." One of the chambers in this cemetery contains a large niche whose rear wall is decorated with the image of a jewelled cross, a popular theme in the early Middle Ages and one often associated with funerary spaces given its obvious symbolic reference to the death and resurrection of Christ. In this specific instance its eschatological implications were further enhanced by the addition of the letters *alpha* and *omega*, the first and last letters of the Greek alphabet, shown hanging as pendants from the transverse arms (Fig. 6). For an audience versed in the Christian scriptures, this would be immediately recognizable as a reference to the mystic vision of the end of time described in the last book of the New Testament. The physical space in question is now flooded with groundwater, with the result that the chamber is no longer accessible. There are earlier engravings, and one watercolour copy, but the Smeaton

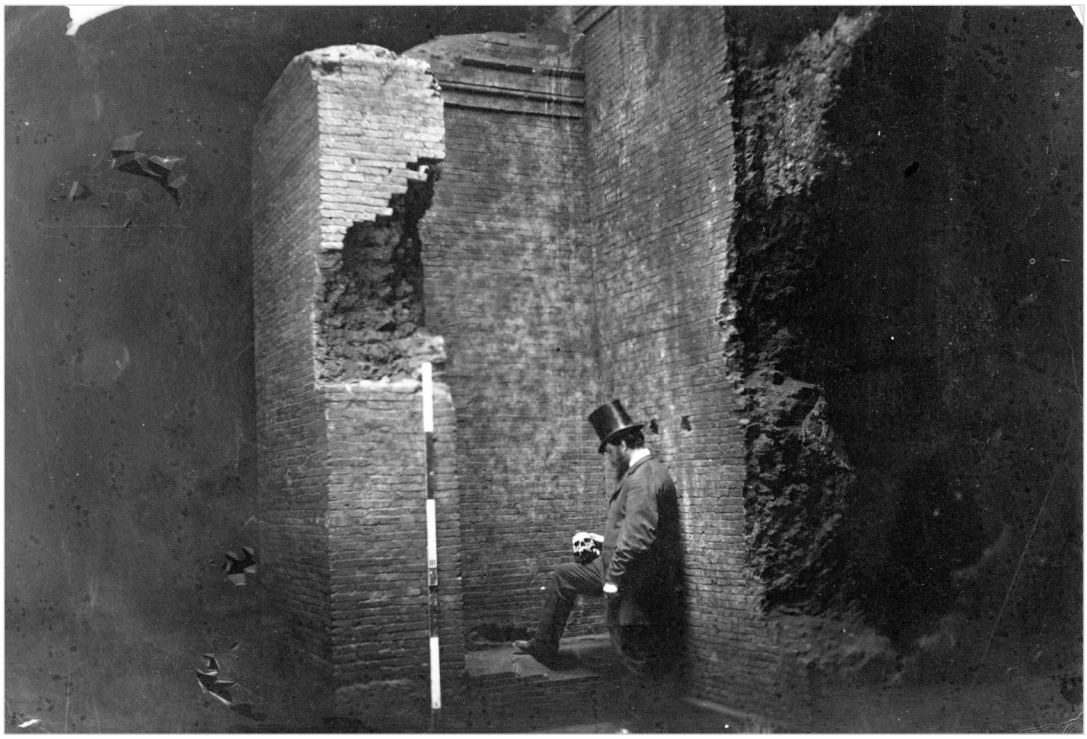

Figure 5. Charles Smeaton, Entrance to the Catacomb of Domitilla (1867). BSR Photographic Archive, John Henry Parker collection, JHP-0620.

image remains the only known photographic record of what was originally depicted in a mural no longer visible *in situ*.[50]

Charles Smeaton never returned to Canada. Tragically, he died in Rome in March 1868, a few days short of his 30th birthday, apparently a victim of the "Roman fever" (malaria). He was buried in the city's Protestant Cemetery, adjacent to the Porta San Paolo and the Pyramid of Gaius Cestius, not far from the tombs of the English poets John Keats and Percy Bysshe Shelley, where his grave may be visited today.

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Figure 6. Charles Smeaton, Mural depicting a jewelled cross, Catacomb of Pontianus, Rome (1867). BSR Photographic Archive, John Henry Parker collection, JHP-0609.

Endnotes

1 For earlier studies of Charles Smeaton, see Andrea Terry and John Osborne, "*Un canadien errant*: Charles Smeaton and the earliest photographs in the Roman catacombs," *RACAR* 32 (2007): 94-106; and John Osborne, "An Incident in the Catacombs: Charles Smeaton and photography in the Catacomb of Priscilla, January 1867," *Rivista di Archeologia Cristiana* 92 (2016): 349-364. The present article is adapted from a monographic study, *Out of the Studio: The Photographic Innovations of Charles and John Smeaton at Home and Abroad*, to be published by McGill-Queen's University Press in 2022.

2 *The Quebec Mercury*, 10 October 1840: 1. For G. W. Halsey and Henry Sadd, see Graham W. Garrett, *A Biographical Index of Daguerreotypists in Canada, 1839-1871* (Manotick, ON: Archive CD Books, 2008), 146-147, 280-281.

3 *The Quebec Mercury*, 5 November 1840: 2.

4 Larry J. Schaaf, *The Photographic Art of William Henry Fox Talbot* (Princeton: Princeton University Press, 2000).

5 Martin Barnes, "Archer, Fredrick Scott," *Encyclopedia of Nineteenth-Century Photography*, ed. John Hannavy (New York: Routledge, 2008), 55-58.

6 Alistair Crawford, "Parker, John Henry," in *Encyclopedia of Nineteenth-Century Photography*, 1053-1054.

7 John Henry Parker, *A Catalogue of a Series of Photographs Illustrative of the Archaeology of Rome prepared under the direction of John Henry Parker in the Winters of 1864, 1865, and 1866* (Oxford: James Parker and Co., 1867).

8 Ibid., v.

9 John Henry Parker, *The Archaeology of Rome*, 13 vols. (Oxford: J. Parker and Co., London: J. Murray, 1874-1877).

10 The Kelsey Museum collection of 3,384 images was purchased directly from the Parker family firm in Oxford by Francis Kelsey in December 1925 for the sum of £60 pounds. See Judith Keller and Kenneth Breisch, *A Victorian View of Ancient Rome. The Parker collection of historical photographs in the Kelsey Museum of Archaeology* (Ann Arbor: University of Michigan, 1980), 8-9. The British School at Rome now houses the set originally in the possession of the British and American Archaeological Society, of which Parker was a founding member.

11 For example, Keller and Breisch; Amira Margiotta, Anna Maria Ramieri, and Simonetta Tozzi, *Un inglese a Roma 1864-1877. La raccolta Parker nell'Archivio fotografico comunale* (Rome: Artemide, 1989); and Christine Kühn, *Italienische Fotografien aus der Sammlung John Henry Parker 1806-1884* (Berlin: Staatliche Museen, 2000). For Parker, see also Pietro Becchetti, *La fotografia a Roma dalle origini al 1915*, 2nd ed. (Rome: Columbo, 1997), 34-35, 330-331.

12 John Henry Parker, "Notes on the dates of the paintings in the Roman catacombs," *The Archaeological Journal* 24 (1877): 431-442.

13 Giovanni B. De Rossi, *La Roma Sotterranea Cristiana*, 3 vols (Rome: Cromo-Litografia Pontificia, 1864-1877).

14 This journal is still published today, since 1924 under the title *Rivista di Archeologia Cristiana*.

15 Louis Perret, *Catacombes de Rome*, 6 vols. (Paris: Gide & Beaudry, 1851-1855).

16 Parker, "Notes on the dates," 433n 4.

17 Parker, *A catalogue of a series of Photographs*, 27.

18 Jessica Dello Russo, *The Discovery and Exploration of the Jewish Catacomb of the Vigna Randanini in Rome. Records, Research and Excavations through 1895*, Roma Subterranea Judaica 5 (Boston: International Catacomb Society, 2011): http://www.catacombsociety.org/wp-content/uploads/2015/04/The_Discovery_and_Exploration_of_the_Jew.pdf (accessed 23 February 2021).

19 For a complete catalogue of Parker's catacomb images, see Klaus-Dieter Dorsch and Hans Reinhard Seeliger, *Römische Katakombenmalereien im Spiegel des Photoarchivs Parker: Dokumentation von Zustand und Erhaltung 1864-1994* (Münster: Aschendorff, 2000), 40-42.

20 John Henry Parker, "Historical photographs illustrative of the Catacombs," separately paginated section in *Historical Photographs. A systematic catalogue of Mr. Parker's collection of photographs illustrative of the history of Rome, and of architecture, sculpture and drawing in Rome, arranged according to subjects*, 2 parts (Rome: Phelps and Co., 1873), II, 2, note 2.

21 *Morning Chronicle, and Commercial and Shipping Gazette*, 27 January 1859: 2; and 17 December 1859: 2.

22 *The Quebec Mercury*, 13 August 1861: 3.

23 *Grand Trunk Railway Gazeteer, Commercial Advertiser, and Business Directory, 1862-63* (Toronto: J. L. Mitchell & A. O. Loomis, 1862), 515. In addition, the listing of "Photographic Artists and Portrait Painters" (612) includes "Smeaton's" as one of four such firms in Quebec City. Ivorytypes were coloured images intended to resemble miniature paintings on ivory, produced in a complex process described by Peter Cooper in *The art of making and colouring ivorytypes, photographs, talbotypes, and miniature painting on ivory, &c., together with valuable receipts never before published* (Philadelphia: published by the author, 1863).

24 *The Morning Chronicle, and Commercial and Shipping Gazette*, 22 November 1864: 2. A print of the Tilley portrait is preserved in the Centre d'archives du Québec: BAnQ Québec, P1000, S4, D21, P24; http://numerique.banq.qc.ca/patrimoine/details/52327/3106526 (accessed 23 February 2021).

25 *The Morning Chronicle, and Commercial and Shipping Gazette*, 25 February 1865: 2 [skating party]; and 18 May 1864: 2, and 19 May 1864: 2 [bagpipe presentation].

26 *The Morning Chronicle, and Commercial and Shipping Gazette*, 7 October 1864: 2; and *The Quebec Daily Mercury*, 28 February 1865: 2. A print of the photomontage may be found in the collection of the Musée national des beaux-arts du Québec, inv. 2006.2999, https://collections.mnbaq.org/fr/oeuvre/600035890 (accessed 23 February 2021). See also Mario Béland, *Québec et ses photographes, 1850-1908. La collection Yves Beauregard* (Quebec: Musée national des beaux-arts du Québec, 2008), 259, cat. no. 302.

27 John Henry Parker, *Photographic Illustrations to accompany the architectural history of Canterbury cathedral by Rev. R. Willis, M.A., F.R.S., Jacksonian professor of the University of Cambridge, selected and arranged by John Henry Parker, M.A., F.S.A., &c* (Oxford: James Parker and Co., [1867]).

28 The WorldCat.org website records copies in London (British Library), Oxford (Bodleian Library), Cambridge (University Library), and Auckland (University of Auckland Library).

29 For an overview of various attempts to develop a form of flash powder that was both practical and safe to use, see Kate Flint, "Victorian Flash," *Journal of Victorian Culture* 23, no. 4 (2018): 481-489.

30 "Artificial light for photographic purposes," *The Photographic News; a weekly record of the progress of photography*, 3, no. 58 (1859): 71. Magnesium is called a "new metal" presumably because its first substantial production in a metallic state, through electrolysis, had been undertaken by Robert Bunsen only a few years earlier. See also Chris Howes, *To Photograph Darkness: the History of Underground and Flash Photography* (Gloucester: Alan Sutton, 1989), 20-21.

31 "Scientific gossip," *The Photographic News*, 4, no. 113 (1860): 316.

32 Howes, *To Photograph Darkness*, 6-17; Nancy M. Shawcross, "Nadar (Gaspard-Félix Tournachon)," in *Encyclopedia of Nineteenth-Century Photography*, 971-974; and Allison C. Meier, "Photographing the Dark: Nadar's descent into the Paris catacombs," *The Public Domain Review* https://publicdomainreview.org/essay/photographing-the-dark-nadars-descent-into-the-paris-catacombs (published 24 October 2019; accessed 23 February 2021). A print of a Nadar catacomb image in the collection of the J. Paul Getty Museum includes a view of his magnesium lamp: http://www.getty.edu/art/collection/objects/39476/nadar-gaspard-felix-tournachon-view-in-the-catacombs-french-1861/ (accessed 23 February 2021). Other Nadar underground photos are available at: https://commons.wikimedia.org/wiki/Category:Photographs of the catacombs of Paris by Nadar (accessed 23 February 2021).

33 The equivalent of about $21 per foot, in today's Canadian dollars.

34 Michael Hallett, "Early Magnesium Light Portraits," *History of Photography* 10, no. 4 (1986): 299-301.

35 Hallett, fig. 4; and Graham Smith, "Magnesium Light Portraits," *History of Photography* 12, no.1 (1988): 88-89.

36 Steven F. Joseph, "Alfred Brothers (1826-1912) and his role in Photographic Publishing," *History of Photography* 11, no. 1 (1987): 63-76, esp. 67, fig. 4; Chris Howes, "Art of Darkness," *New Scientist*, 124 , no. 1696 and 1697 23-30 (1989): 13-16; and Howes, *To Photograph Darkness*, 32-35. For the subsequent history of cave photography: Chris Howes, *Images Below: A Manual of Underground and Flash Photography* (Cardiff: Wild Places, 1997).

37 Alfred Brothers, *Photography: its History, Processes, Apparatus and Materials* (London: Charles Griffin and Company, 1892), 65.

38 Hugh W. Diamond, "Report on Photographic Proofs and Apparatus," in *Reports on the Paris Universal Exhibition, 1867* (London: George E. Eyre and William Spottiswoode, 1868), II, 169-183, at 182. Hugh Welch Diamond (1809-1886), a surgeon and psychiatrist, Superintendent of the Female Department of the Surrey County Lunatic Asylum (1848-1858) and afterwards Director of a private asylum in Twickenham (1858-1886), was himself a pioneer in the use of photography for the categorization and diagnosis of psychiatric disorders: see Rhodes, "Diamond, Hugh Welch," in *Encyclopedia of Nineteenth-Century Photography*, 415-417.

39 Charles Piazzi Smyth, *Life and Work at the Great Pyramid During the Months of January, February, March, and April, A.D. 1865, with a Discussion of the Facts Ascertained*, 3 vols (Edinburgh: Edmonston and Douglas, 1867). See also Larry Schaaf, "Charles Piazzi Smyth's 1865 Conquest of the Great Pyramid," *History of Photography* 3, no. 4 (1979): 331-354; Howes, *To Photograph Darkness*, 24-31, 36-41; and Britt Salvesen, "Piazzi Smyth, Charles," *Encyclopedia of Nineteenth-Century Photography*, 1124-1125.

40 Piazzi Smyth (2: 279-292) provides only a brief account of his photographic process, which made use of a specially-designed apparatus to take both "wet" and "dry" images on glass plates. He lists some 166 images, mostly of the Great Pyramid (66) but also of the other monuments at Giza.

41 Ibid., 282.

42 *The Quebec Daily Mercury*, 27 April 1864: 2.

43 Roger Hall, Gordon Dodds, and Stanley Triggs, *The World of William Notman: The Nineteenth Century through a Master Lens* (Toronto: McLelland and Stewart, 1993), 10; Sarah Parsons, *William Notman: Life and Work* [electronic monograph] (Toronto: Art Canada Institute, 2014), 46; and Hélène Samson and Suzanne Sauvage (eds.), *Notman: A Visionary Photographer* (Montreal: McCord Museum; Paris: Hazan, 2016).

44 http://collections.musee-mccord.qc.ca/en/collection/artifacts/VIEW-596.A.3 (accessed 23 February 2021). At least some of the photographs in this series were available to audiences in Quebec City, as noted in *The Quebec Daily Mercury* on 21 March 1866 (p. 2): "We have seen some very fine photographic views of caribou hunting, by Notman. They have been taken from nature, and are executed in the highest style of the art."

45 "Dr. Girdwood's Lecture on Combustion," *Montreal Gazette*, 1 April 1865: 2.

46 *The Morning Chronicle, and Commercial and Shipping Gazette*, 17 December 1859: 2.

47 William Notman, *Photographic Selections* (Montreal: John Lovell, 1863) [unpaginated]. See also Joan M. Schwartz, "With Word and Image: Notman and the Photographically Illustrated Book," in *William Notman: A Visionary Photographer*, 144-151.

48 For the full text, see Osborne, "*An Incident in the Catacombs,*" 358-362.

49 Being abandoned underground with no light had become something of a regular *topos* in accounts of catacomb visits. For example, the English novelist Charles Dickens had expressed a similar fear related to his 1844 visit to the catacomb of St Sebastian; see Charles Dickens, *Pictures from Italy* (London: Bradbury & Evans, 1846), 198, and also Massimiliano Ghilardi, "'Caverns of death'. Charles Dickens e le catacombe," *Studi Romani* 50 (2002): 3-22.

50 John Osborne, "The Roman Catacombs in the Middle Ages," *Papers of the British School at Rome* 53 (1985): 320.