Willful Spectacles
The Splendid Camera Obscuras & Popular Observatories of Miss Maria Short

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Abstract

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Histories of old media generally locate women on view and in the audience, but rarely position them as owners or operators in control of a screen. An archival study of the forgotten founding of Edinburgh's Camera Obscura by Maria Theresa Short addresses this shortcoming and explores a device that is itself marginalized by media scholarship. Whereas most accounts abstract the camera obscura as a teleological forerunner and foundational component of inscriptive optical media, or as a metaphor of disembodied and distantiated vision, they overlook its use as a nineteenth-century exhibition apparatus, especially in connection to women and scientific spectacles. Yet one of the foremost and oldest purpose-built attractions in Edinburgh boasts an extraordinary history that speaks directly to such absences. In a towertop walk-in optical device, spectators stand in the dark around a touchable tabular screen while operators manipulate the capture and projection of a live, vivid and moving image of the city, which they present as a virtual guided tour. My research, pursued from a perspective of feminist media studies, explores how an unknown but willful spinster came to display this splendid apparatus and exhibit "the sublime truths of science" before the mid-nineteenth-century emergence of public museums and in defiance of municipal leaders, who would see to the demolition of her first venture. It comprises an in-depth inspection of Scottish archives that details the tactics, tensions and controversies surrounding the mysterious Miss Short and her popular observatories, and uncovers a history of scientific ambition and struggle that helps illustrate the culture in which they operated. Like the optical devices it investigates, "Willful Spectacles" reveals a complex and miniaturized monad that stands in for a shifting world where public space, its views and viewers were gendered, classed, and open to contestation.

Keywords
camera obscura, feminist media history, microhistory, nineteenth-century Edinburgh, popularization and professionalization, science and spectacle, screen studies

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My work profited from numerous workshops and conference presentations in Montreal and abroad. Yet I found my academic kin among members of the Society of Animation Studies and Domitor. Thank you to Donald Crafton, Tom Gunning, Caren Kaplan and Linda Williams for helping me think through vision, visuality and corporeality. Guidance from journal editors Nichola Dobson, Maureen Furniss and Amy Ratelle improved my compositional skills. Of my Concordia-based research-creation writing group, what can I say? They nourish me with camaraderie, succor and intellectual inspiration.

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As for the Edinburgh Camera Obscura, I am indebted to its director and general manager Andrew Johnson and his staff. They provided me with digital images, research material, and complete access to their site. Such generosity helped kickstart my study and kept it going. It thrills me to imagine that some of my research might contribute to presentations of their famed device.

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A Short Introduction

Imagine yourself in a room so dark that you see nothing but a single beam of external light. Your pupils dilate, your eyes adjust, and there you are spying, sharing (perhaps even touching) a virtual, vivid, and full colour moving picture of outside activity as it happens. There is no CCTV, no web camera, drone, or satellite, nor any kind of filmic, electronic or digital device, and none of the artefacts such technologies effect—no grain, no noise, no glitches in time. Only a mirror and a lens project sunlight into shadow, and cast onto the whitewashed table at your fingertips a live and uncanny scene. You huddle around the circular screen to watch the traffic and unwitting denizens of the town below as they go about their affairs like miniatures on an animated map. Then, using the controls that hang from the ceiling, your guide rotates the image before you into a new view that is facing the opposite way. As she conducts a virtual tour of outside surroundings and you double your gaze to accommodate the swivelling of imagery askew, you wonder: What is this thing? How does it work? Who built it? When and Why?

The year is 1836 and you stand inside the popular observatory of Maria Theresa Short—an unmarried, unconnected and unmoneyed woman of a certain age but an uncertain origin—who a year ago opened this Calton Hill venue. They call her Miss Short as a nineteenth-century measure of respect and in recognition of her longstanding independent status, yet her project dismays the Edinburgh elite. Home to a scientific observatory and dotted with monuments to great men of conflict and enlightenment, the city-owned summit offers panoramic prospects that this venture called *Short's Observatory* enhances and supplements, with optical instruments and other displays. With the invention of photography not yet announced, and the cinema still being decades away, it promises for your viewing pleasure and one shilling entry, access to telescopes, microscopes, kaleidoscopic and dissolving views, and the latest marvels that technology offers. Yet the spectacle that presently holds your gaze emerges only when lamps go out and shutters close, and by a long-observed optical phenomenon, the enclosure itself becomes an apparatus of display. Calton Hill and the city that surrounds it, live projected on the surface of Miss Short's screen. A bird's eye view of Edinburgh, the city they call Modern Athens, streams in,

> And here public and private edifices of the most splendid description crowd our notice: the convenience of a rectangular distribution of buildings, uniting with the elegance of the encurved street and the circus; and the regular outline of the whole finely contrasted with the crowded and shapeless masses of the Old Town and the bold ruggedness of the natural scenery (Modern Athens, v).

Advertisements and reviews for Short's Observatory and its competitors sometimes call the optics you are experiencing, a *splendid camera obscura*—a designation I adopt here to specify the nineteenth-century architectural apparatuses that this study features (figures 3, 17, 18, and 19) and to distinguish them from other displays (see figure 14, for examples). According to its OED definition and etymological root, *splendid* signifies both the brightness and grandness of the then-modern walk-in displays, whereas absent that modifier, *the camera obscura* is an older and more general term that also denotes earlier and contemporary related devices designed for mobile and personal use, as well as the optical phenomenon that produces their effect. That light entering a dark enclosure through a small aperture casts a moving image of the exterior onto the surface opposite its entry had already seen centuries of diverse configurations, sizes and different applications, when nineteenth-century refinements to optical instrument-making enabled larger projections, and periscopic rooftop arrangements mobilized mechanical eyes to scan all around and shift outlooks between near and far. The splendid camera obscura literally places a room (*camera*) between brightness (*splendidus*) and darkness (*obscura*), and whetted by appetites for other splendid exhibitionary forms—such as panoramas, dioramas, and electrical displays—this new type first emerged centuries after early applications of the phenomenon by astronomers and natural magicians, and decades before photography's announcements of its chemical inscriptions. Scattered across the UK, Europe and the colonized world throughout the nineteenth century and into the early twentieth, such walk-in devices overlooked places of public leisure as permanent and seasonal displays in sites such as popular observatories, pleasure gardens, seaside resorts, etc. Despite a handful of extant and newer installations, countless operations like the one conjured above would be lost by the mid-twentieth century, and the experiences and potential controversies they wrought, largely forgotten. This study begins to recover the history of these splendid camera obscuras and their entanglements with gender, science, and discourse by focusing on their deployments by Miss

Maria Short in the first half of the nineteenth century. By aiming my lens at this willful woman, I investigate how an optical apparatus could be employed for different and often competing purposes, including disruptions of its dominant and strategic uses through its operation by marginalized subjects.

The history in brief

In the summer of 1834, a battle erupted in Edinburgh over the plans of an unprotected female to build a popular observatory on Calton Hill. The Solicitor-General of Scotland Lord Henry Cockburn "instantly assailed the council, and excited the press, and agitated in all quarters" to prevent the desecration of the city's celebrated summit by Miss Short and her exhibition of optical instruments (Cockburn, *Journal I* 62). Ever concerned with picturesque notions of civic beauty, he railed alongside university professors and the gentlemen of the private Astronomical Institution who likewise strove to block the project. Discounting or perhaps dreading the pledge put forth by Short's subscription pamphlet to extend the "sublime truths of science" beyond the exclusive scope of the "wealthy and the learned," the wealthy and the learned entreated Town Council as the city's "guardians of good morals" to disallow the installation of what they imagined as her "paltry show box" in public space (*The Scotsman* 23 July 1834, Appendix D). In a published letter to city magistrates that described Short's ambition as a "profanation of that sacred ground," Cockburn glossed over her plans to exhibit her family's Great Telescope and reviled in particular her proposed camera obscura. Claiming that it would "be speedily followed by the erection of Panoramas, Dioramas, the migratory mansions of Travelling Giants, Wonderful Dwarfs, wild beasts, etc, etc," he fretted over who and what Miss Short's venue would bring to Calton Hill and the improprieties they threatened to herald (Ibid).

Having briefly heeded the hullabaloo, Town Council approved a revised proposal a few months later for Short to build her observatory on a less conspicuous place on the summit (figures 9, 10 and 11). The matter was however not entirely settled; it was neither her first nor final clash with local leaders, and the controversy that she and her venue engendered persisted. Fifteen years after its 1835 opening, citizens and leaders were still tussling over the status of Short's Observatory, when ongoing complaints against its publicizing tactics and competition with a

newly installed device just yards away, resulted in a ruling that mandated Short's eviction. Alongside three appeals from the feisty proprietress, four thousand citizens signed a petition requesting her establishment be preserved for the "benefit of the public," and some city magistrates refused to condone the removal that one councillor called a motion to "destroy science" (*The Scotsman* 2 October 1850; *The Caledonian Mercury* 3 October 1850). Nevertheless, the Lord Provost already had enough of being "worried to death by this woman" (*The Scotsman* 12 June 1850) so without prior notice, "the observatory was invaded at an early hour, the instruments were thrown out upon the hill, and the building demolished" (ECA TC Minutes [254] 443, Appendix H).

Following the destruction, Short (who had become Mrs. Henderson through a midlife marriage) moved from New Town to Old Town—migrating in the opposite direction of the Edinburgh elite. She bought property on Castlehill, the high ground between Edinburgh Castle and the Lawnmarket on the west end of the High Street (also known as the Royal Mile) and the oldest and then largely forsaken area of the city (figure 15). In place of the town house once supposedly owned by the legendary Laird of Cockpen (Grant 91), she built a six-story tower for a new exhibition and crowned the second Short's Observatory with its own splendid camera obscura. Short opened the building in 1855 and died inside of "debility" fourteen years later at the age of 81.[1] And although her widower passed away soon after, the site and its device endured as an attraction through subsequent tenants and owners. Sir Patrick Geddes, Short's most prominent successor, renamed the building *Outlook Tower* and made its camera obscura instrumental to his headquarters for urban study as "the world's first sociological laboratory" (Zeublin). Though owned for a time by the University of Edinburgh, its present owners Visitors Centre Ltd have operated what they describe as the city's "oldest purpose-built attraction" as a tourist site since the late 1970s. At the top of what is now known as *Edinburgh's Camera Obscura and World of Illusions*, guides give virtual tours of the city at least twice every hour on its tabular screen. Their audiences marvel at the vivid detail and the commanding aspects of the old-style projections of live motion pictures. In other words, time travelling to the nineteenth century is unnecessary to experience the application of optical technology once operated by Miss Short.

Not philosophy

In *Willful Subjects* (2014), feminist scholar (and self-admitted killjoy) Sarah Ahmed defines willfulness as "a diagnosis of the failure to comply with those whose authority is given" (1). Therefore, a willful subject is not simply a subject that exercises will, which the OED describes as a "deliberate or fixed desire or intention," but rather their will is of the unauthorized kind. My thesis reveals a history of willful, unauthorized, and unauthored subjects. Most notably, there is Maria Theresa Short, but situated alongside her, are defiant actors and suspected charlatans—unruly parents, litigious relations, a convicted fraud, and the disorderly gapers and gawkers she presumably attracted with her displays. Short's splendid camera obscura, as a source of consternation, makes for another willful subject. In its time, the device was both reviled and celebrated by prominent men of politics and academia, and since, has been neglected by scholars that recognize only its ancestors, which they confine to earlier times.

And finally, this thesis is itself rather willful, being on some level akin to what Ahmed describes as *not* philosophy. Her own research "aims to create room within philosophy for others who are not philosophers" (*Willful Subjects* 15); her citation practice includes sources who are *not* philosophers and refuses to privilege the texts of those who are. She furthermore explains, "*Not philosophy* is also a *philosophy of the not*" (Ibid, original emphasis); it is a queering or a questioning of accepted thought that often perpetuates the prescriptive notions that become patterned as norms. While earlier accounts have alluded to letters by Maria Short, I include their full transcription in the Appendix, alongside scans of her promotional materials, as well as the transcription of a letter written by Elizabeth Beverly recorded within a 1793 Act of Town Council that recounts the history of the failed observatory project of Short's parents. Because these women are otherwise unpublished, it is important that readers be able to assess the clarity and strength of their words unedited. This is meant to counter tendencies that exclusively associate space and vision with patriarchal power and obscure marginal actors. Like Short, Beverly and Jacobina Downie (Short's mother) struggled to provide for themselves through unconventional means—each challenging, and perhaps surprising, city magistrates with their intentions to manage and charge access to optical instruments under their care.

Ahmed calls her book *Willful Subjects* itself a "willful girl-child, the one who insists on getting her own way," and she moreover explains, "the willful subject is often depicted as a wanderer" (21). In kinder moments, this might also be said of my own research practice—it wanders. Yet the willful subject does not simply stray from established or straight-ahead pathways, the willful subject ignores or even defies discipline. A considerable amount of inter- or anti-disciplinary straying therefore marks this study, which I have willed into a three-part structure that then breaks apart into multiple subdivisions. The sections that follow this introduction and precede my final summation, effectively function as 1) methodology and review; 2) history; and 3) analysis.

Part One, subtitled "Approaching the Apparatus," has two main chapters or subdivisions: a discussion of related fields and approaches, and a literature review. Although I position this research as a media study, my section on methodology begins with a brief discussion of scholarly genres that investigate the historic roles of women in science and media technology, and old optical media. I then discuss archival research and microhistory as approaches used to complete the core of historical research in this study. My literature review comprises a historiographic analysis of the camera obscura and it explores the relative lack of scholarly work on its splendid nineteenth-century variation. There, I also discuss Jonathan Crary's theory of historicized vision, which inspired much of this study. Part One concludes with a consideration of existing research on splendid camera obscuras, and considers the work of enthusiasts and operators, and their exchanges with scholarly researchers, as frequently hidden forms of knowledge sharing and production.

Part Two, "Picturing Willfulness" concerns the history of Maria Short and the splendid camera obscuras of Edinburgh in the first half of the nineteenth century. Primarily informed by archival research, it unfolds in three chapters. First, I explore the early history of Maria Short, which includes activities of the prior Short generation in the last quarter of the eighteenth century, alongside Maria's return to Edinburgh in 1827 and the reclaiming of her inheritance—the Great Telescope—in 1828. In the subsequent chapter, I follow Short's progress as she attempts to sell the old instrument, and failing that, how she makes the decision to exhibit. This central section

uses secondary research to contextualize Short's shifting tactics used as she moved towards active participation as a business proprietrix, within a broader culture of scientific and disciplinary ambition and the accumulation of cultural capital by an emergent middle class. Finally, I recount the histories of Short's Observatory, as well as two other popular observatories on Calton Hill that also featured women-operated splendid camera obscuras as their primary attractions. Appendix I ("A Cast of Characters and Events") identifies actors and significant events and it is located at the very end of this thesis. I compiled it to provide a useful reading companion to this section.

Part Three, "Visualising Discourse" comprises five chapters that frame the preceding parts in relation to discourses of power, which I connect to the splendid camera obscura through its architectural disposition, representations in popular media, and actual operations. Opening with a genealogical review that further considers the association between splendid camera obscuras and astronomical observatories, its first three chapters explore dominant ideologies of visuality, space and gendered surveillance. For the remainder, I consider the actual exhibition of a splendid camera obscura—drawing from my own experiences, as well as older reports. I explore its tactile qualities and the agency of the operators that exhibited the devices as real time and unscripted (or loosely scripted) performances. Finally, through an examination of contemporaneous images—illustrations, paintings and photographs—I conclude this section by considering what the Edinburgh camera obscuras could see and show. With their ability to make things visible or invisible through manipulations and narrations of those screens, I argue that whoever operated a splendid camera obscura performed from a space of power and potential resistance.

Part One: Approaching the Apparatus

I. Methodological Scopes

Approaches

This thesis connects to interdisciplinary fields of study that challenge disciplinary apparatuses, and specifically optical arrangements, as strategies that work from the imbrication of power and knowledge. The theorizing of this relation is attributable to Michel Foucault (*Discipline and Punish*; *History of Sexuality I*; and *Power/Knowledge*), and has been taken up by numerous scholars in a range of fields, not the least of which include media studies and science and technology studies—areas that are themselves varied and unbounded. Here, I apply an expansive understanding of media studies to include all scholarship that explores visual culture studies, screen-based media, and optical surveillance practices and especially from fields more formally recognized as Communication Studies, Film Studies, and Art History. While researchers from these areas frequently share objects of study, it is the historical aspect of my research that complicates its qualification as the history of a scientific phenomenon. Before the late nineteenth century, as Bernard Lightman and Aileen Fyfe explain, "complexities implied by the gradual emergence of a robust definition of scientific expertise" trouble the distinction of numerous activities as scientific or popular (*Science in the Marketplace* 2). Therefore, this study draws from histories of science, even though my study concerns popular exhibition (understood here as a primarily leisurely pursuit) and not scientific or technological innovation.

Nevertheless, all studies of science inevitably link to questions of knowledge and searches for truth, and feminist critiques of science—work by Donna Haraway, for example—ground feminist and postmodern approaches within, and beyond, STS and media studies. Banu Subramanian contends that methods and epistemologies theorized by feminist science scholars are exciting and productive approaches that have arguably been "mainstreamed and used widely in science and technology studies while not always explicitly focussed on gender" (960).[2] The categories she defines as the "classical core of feminist science studies" are essentially critiques of power, comprising challenges to scientific truth claims as objective and value-free

by demonstrating that ideology permeates scientific structures, technologies, language and visual culture, which naturalize and reinforce existing hierarchies through the construction of sexual difference (955). Early feminist critiques of science, like early feminist critiques of visual media examine historic representations of women (such as gaze theory)—unpacking scientific constructions of biologically-determined differences that have "deep historical roots" and that continually re-emerge (956). While addressing its suppression, control and exclusion of women, feminist scholars search for areas of participation and agency, remaining oriented towards change and often performing historiographic acts of recovery. The latter require opening analyses beyond the trope of "original discoveries," to reveal a dense set of activities by women and others, omitted or obscured by disciplinary exclusion (Maddrell). For example, in *The Mind Has No Sex?* (1989), Londa Schiebinger locates scientific women in the eighteenth and early nineteenth centuries operating in "elite networks" (pursuing knowledge through private instruction, and acting as social facilitators) and in "craft traditions" (often as wives, sisters, and daughters working in home-based laboratories, field studies and workshops). Meanwhile, those researching popularizers of nineteenth-century science—a topic that has exploded in recent decades— find that those engaged as conveyors and as audience members came from all walks of life to participate, alongside so-called experts, in the promotion and transformation of Western science.[3] Barbara Gates and Ann Shteir, for example, have examined the numerous women writers who diffused scientific thought through translations of scientific texts, pedagogical materials and generalist tracts. Several biographies have featured Mary Somerville, the "Queen of Science"—the Scottish writer, savant, social maven, and much lauded contemporary of Maria Short (Mary Brück, Patterson, Schiebinger, et al). In *Science in the Age of Sensibility* (2002), Jessica Riskin adopts an alternative approach by exploring scientific empiricism during the French Enlightenment through sensibility as the "capacity to perceive impressions of external objects" and sentiment as "emotional 'movement' in response to physical sensation" (1).

The splendid camera obscura and popular observatories of Maria Short are akin to the sights and sites of science considered by Riskin, despite the geographic and temporal distance between their concerns. Phenomena such as expositions, museums, gardens, zoos,

instruments, illustrations, etc., also draw analyses from film and media historians, and especially feminist media scholars who, like Riskin, pay special attention to notions of embodiment. Giuliana Bruno, for example, notes that scientific and geographic atlases share "representational modes" and describes traditional geographies as dominant (often colonizing) discourses that made women into a "geographic object" and "feminized the very notion of land itself" (211-12). In *Atlas of Emotion* (2002), Bruno takes her readers on a journey through a series of spectacular architectures and objects including gardens, waxworks, and curiosity cabinets, as well as films, to explore connections between motion and emotion by positing spectators as peripatetic and embodied. Alison Griffiths, on the other hand, explores how churches, panoramas, science museums and other spaces promoted modes of looking that are said to send "shivers down your spine," to contextualize and ground discourses of immersion and interactivity that pervade recent discourses of cinema and new media. Although she acknowledges that "even the act of seeing is subject to historically specific connotations" (*Shivers* 35), Griffiths includes her own reactions to her sites of investigation, which is an approach that I too explore. For even though reproducing a "period eye" is impossible (17), first hand interactions help frame old claims.

Recognizing that audiences and users also define technologies, and that technologies are experienced differently by different bodies in different situations, feminist media scholars not only share objects of inquiry with their counterparts in science, they similarly address the dominance and exclusion of women by looking at factors beyond inventions and prodigies. In other words, theirs are critiques of apparatuses that structure relations of gender. Moreover, they bypass and thereby challenge existing hierarchies by examining aspects that are often overlooked. For example, Carolyn Marvin demonstrates that feminine communication style redefined and refined telecommunications as a social practice, in defiance of protocols that emphasized efficiency in early telegraphy and telephony, and despite ridicule and direction from (masculine) "experts" (22-32). Likewise, researching how consumer demands turned phonography away from its inscriptive capabilities (that Edison and his investors had envisioned for selling mechanical dictation devices) into playback-only machines for home entertainment, Lisa Gitelman explains that "Media are more properly the results of social and economic forces,

so that any technological logic they possess is only apparently intrinsic" (10). Historians of media technology like Marvin and Gitelman therefore also inspire this exploration of how Maria Short and other non-experts used scientific instruments for unprescribed purposes.

My research bears similarities to focused studies of related and contemporaneous media phenomena like Barker's panorama (Oleksijczuk), Robertson's fantasmagoria (Milner), Tussaud's waxworks (Kornmeier), as well as the displays at the Paris Morgue and Musée Grevin (Schwartz). It contributes to proto-cinematic histories of modern spectacular culture, characterized as modes of "monstration" or "attraction" by Andre Gaudreault and Tom Gunning (Strauven "Introduction to an Attractive Concept" 15) and it supplements existing media scholarship on the camera obscura, which I cover in some detail in my literature review. Although markedly absent from their pages, a discussion of the nineteenth-century splendid camera obscura would fit well within a number of expansive histories of optical exhibition media like canonical tomes, such as the *Archaeology of the Cinema* (1965) by C.W. Ceram, *The Shows of London* (1978) by Richard Altick, and *The Great Art of Light and Shadow* (originally published in French in 1995, translated into English in 2000) by Laurent Mannoni. There are also two collections of *Visual Delights* (2000, 2005) edited by Vanessa Toulon and Simon Popple, texts by John Plunkett (such as *Multimedia Histories: From the Magic Lantern to the Internet*, co-edited with James Lyons, 2007), and numerous other studies of nineteenth-century visual culture that explore phenomena that were temporally, spatially and culturally proximate to the splendid dark rooms presented by Short. However, all of them miss my main objects of concern. The splendid camera obscura could thus be included among the countless optical media of the nineteenth century—the "hundreds of little machines" that Jean-Luc Comolli characterized as leading up to the late nineteenth-century "frenzy of visible"—that scholars have yet to research (122).

To position old optical technologies as pre-cinema is nevertheless a "retrospective naming" that, as early cinema and animation historian Donald Crafton cautions, reduces the value of an object to a "future becoming what presently they are not" ("Veiled Genealogies" 97). In debating the primacy of animation over cinema, which proponents such as Lev Manovich base

on the pre-photographic appearance of optical toys that featured the "animation effect" (the illusion of movement from still image sequences), Crafton argues that "demonstrating a shared reliance on this physiological trait offers no support for the paternal claim that earlier applications were necessary for later ones" (96). He contends moreover, "The animation effect is unrelated to such things as the circumstances of production, exhibition and reception that define cultural performances" (Ibid). As a member of a different "cultural series"—a categorical term used by Gaudreault and Dulac to encompass different optical toys ("Circularity and Repetition" 227-243)—the camera obscura, as I discuss in further detail, is commonly identified as the forerunner to photography. However, to exclusively align its nineteenth-century architectural form with the coming of cinema, a phenomenon with which it coincides as well as predates, would mean swapping one teleology for another.

Many might identify my research as media archaeology because it refuses a thesis of technological evolution and continuous development, and focuses on a neglected or forgotten media form. However the approach, often associated with scholars such as Erkki Huhtamo, Friedrich Kittler, Wolfgang Ernst, and Jussi Parikka, encompasses a diverse set of methods and concerns that frequently cover broader spans of time and geographical ranges of analysis and pay less attention to cultural context, so I am reluctant to make that identification.[4] Still, I acknowledge a kinship, and especially with Huhtamo's *Illusions in Motion* (2013), which comprises over a decade of research on the moving panorama and is rooted in cultural history (xvii-xviii). Explaining how that study differs from those of scholars who attend to the epistemological call of "positing large-scale formations and the ruptures between them," (in other words, the historical model presented by Foucault in *Archaeology of Knowledge*), Huhtamo writes,

> It is more concerned with how media spectacles function in and between local circumstances, giving rise to discursive "transfigurations." This book therefore advocates a different media archaeology, making a case for humans who concoct media spectacles with other humans in mind. Their interactions—collective and individual, conscious and unconscious—mold the media. The stance is closer to Anglo-American cultural studies, and is based on the assumption that although hard technological facts matter, the discourses that envelop them and mold their meanings play an even more decisive role (17).

He moreover cites Carolyn Marvin who observes, “The history of media is never more or less than the history of their uses, which always lead us away from them to the social practices and conflicts they illuminate” (*Illusions in Motion* 14; Marvin 8)

Archival Research

At the core of this text is a chronological narrative with a scale that is limited in space and time. It centres on one person, one popular observatory, one kind of instrument, and one city. It starts with the foundational failure of Thomas Short, Maria Short’s father, to establish the first astronomical observatory in Edinburgh in the final quarter of the eighteenth-century, skips decades forward to the founding of Maria’s popular observatory on the city’s Calton Hill, explores the splendid camera obscura as her signature device, uncovers similar installations in the area, and discusses the mid-nineteenth-century destruction of her venue and its re-establishment one mile away on Castlehill. It is a relatively narrow yet detailed view, informed by deep dives into Scottish archives contextualized through research on the development of science and astronomy and its interaction with shifts in the socio-cultural landscape of nineteenth-century Edinburgh and Britain. In the shortage of scholarship on my specific objects of study, much of my investigation entailed following the footnotes of existing research and then working outward from those sources. In particular, that meant retracing the steps of Veronica Wallace whose brief 1992 article in *Edinburgh Review* fittingly titled “Maria Obscura” represented the most focused and comprehensive study published to date.

Determined to answer the question that Wallace implicitly posed, “Who was Maria Short?”—my research took place in physical archives, which supplemented countless hours spent exploring online newspaper archives (such as *The Scotsman Digital Archive* and the *British Newspaper Archive*). I haunted the search rooms of archives and libraries in Edinburgh and throughout the UK, unwrapping and deciphering bundles of yellowing manuscripts. I found that the increasingly digital landscape of archived media offers considerable advantages that encouraged my hope that I might find a definitive answer. Keyword searches on names, documents, and topics cited within sources continuously lead to new paths of investigation, such that my study took a rhizomatic or genealogical form resembling a sort of de-centred

family tree that expands in numerous directions. Over the course of three years, in weeks- and months-long stays in the UK, I made multiple visits to the Edinburgh City Archives, the General Register House of the National Archives of Scotland, the National Library of Scotland and the Special Collections at the University of Edinburgh. I also found supplementary source material at the Edinburgh Royal Observatory and the Edinburgh City Library. Moving slightly afield to research related technologies and installations, I also explored collections held at the Dumfries Museum and Camera Obscura, the University of Strathclyde (their Patrick Geddes Archive), the National Science and Media Museum in Bradford, the Bill Douglas Cinema Museum Collection at the University of Exeter, the Cambridge University Library and Whipple Library and Museum, the Royal Polytechnic Institute archives at Westminster University and the British Library. Though far from comprehensive, digital catalogues of collection holdings (often remotely accessible by the Internet) and especially those that itemized contents of bundles and boxes, helped me locate hidden gems. What is scanned and available online represents a fraction of collected resources. While variations in the quality of existing digitization and the exclusively analogue existence of certain indices called for extra search time during in-person visits, an increasing tolerance for, and often encouragement of, the use of digital photography reduced the necessity of immediate transcription—maximizing time spent on site, and enabling offsite re-examinations. In a few cases when I could not retrieve a document in person, a kind archivist or overseas scholar has sent me digital copies by email.

New technologies that transform archival research methods may generate new knowledge and interpretations of the past. Their affordances supplement but nevertheless, do not replace the benefits of visiting reading rooms and handling original artifacts. When time permitted, and especially when poor lighting conditions or tight folds or bindings compromised photographic quality, I transcribed significant texts on site. Historian Arlene Farge refers to recopying as an "artisanal task," but avers "an archival document recopied by hand onto a blank page is a fragment of lost time that you have succeeded in taming…it is through this action that meaning is discovered" (17). While I also used pencils and notebooks, I found that even transcription by typing into a laptop augments understanding by necessitating close attention to text. Moreover, digitization generally focuses on capturing content and cannot record aspects of

archived material that engage touch and scent. Farge also observes that accidental discoveries of material objects communicate a "feeling of certainty" and the "privilege of 'touching the real' ", and she describes the impact of a centuries-old packet of seeds or piece of cloth as the "physical pleasure of finding a trace of the past [that] is succeeded by doubt mixed with the powerless feeling of not knowing what to do with it" (11). Yet there are non-verbal things in an archive that can inform the researcher in more concrete ways. Watermarks, margin notes, administrative notations, and the physical organization of a bundle (what it contains, where it is located, how it is labelled) can be telling. The resistance of a tightly folded bundle tied with stiff, knotted twine instead of cotton tape suggests an untapped source; paper quality and weight may signal a document's importance; and a watermark may indicate origin. Finally, there is satisfaction in normally unspoken communions with other researchers that are deep within their own investigations. I have happily overheard, as well as made, chuckles of delight, excited gasps and whispered chatter generated by a long-searched for, or unexpected, find. Can anything substitute for the thrill of discovering a document that is significant but long forgotten? The sense of fellowship experienced among others wading through their own piles? Or the insight of a knowledgeable and affable archivist?

Materiality, embodied experience and the historiographic processes of archival research are central concerns of Carolyn Steedman in *Dust: The Archive and Cultural History* (2002). Steedman writes of the ague that sometimes grips historians who inhale the toxic dust of the old bundles they study. Such fevers are more than existential ills. Yet even if the thrill of the search is also kind of fever, a historian's belief in an archive's evidentiary power is hardly a given. Steedman explains that from the beginnings of its mid-nineteenth century positivist origins, practitioners of modern history already recognized its implicitly impossible-to-complete nature. With historians knowingly "*telling the only story that has no end*" (148, original emphasis), she notes that their conclusions are always understood as impermanent and contingent because exhaustiveness is an unattainable goal. In an archive, donation and reorganization make ever-possible new finds, new losses, and new associations of meaning. The ability to craft a comprehensive historical narrative supported by archival material becomes no more likely with technological change. The implementation of new processes can be instead

disruptive, with replacements of archivists and cataloguing systems causing the knowledge of holdings and their accessibility to be lost. Operational changes at various archives posed challenges to my research. New catalogue numbers for digital systems made older citations sometimes difficult to track, while shifting priorities and the loss of staff (for example at the Edinburgh City Archives) will make my own sources harder to verify. Yet with an abundance of voices that call out from their stores, Farge writes, "The archives do not necessarily tell the truth, but as Michel Foucault would say, they tell *of* the truth" (29, original emphasis). For Foucault, the Archive is the system that determines what can and cannot be said. In the approach that he outlines in *Archaeology of Knowledge*, Foucault recommends that researchers seek the discursive shifts and patterns that make certain statements possible, and replace notions authorship and continuity with discourse and rupture.

Steedman's *Dust* is a somewhat ironic response to *Archive Fever* by Jacques Derrida, which is more of a psychoanalytic tract on an institutionalized will to memory than a description of actual archival encounters. Derrida associates the contents and organization of the Archive to the *archons* ("superior magistrates"), the *arkheion* (their house) and the *arkhe* (beginning) and explains, "The archontic power, which also gathers the functions of unification, of identification, of classification, must be paired with the power of *consignation*" (9-10). Aside from the occasional grouchy archivist or librarian, I rarely met the kind of archon or superior magistrate that Derrida might have us dread. Steedman identifies the Magistrate as someone who "listened then, to the stories of the *miserabiles personae* with whose care he was charged" (45). It is their voices that emerge from the yellowing bundles, and even if those voices are mediated—by the questions they answered and the writers who recorded them—, their testimonies bristle with an unexpected vitality rarely captured by second and third-hand descriptions. Farge notes that "women are astonishingly present in the eighteenth-century city" (33) and while she studies the judicial archives of Paris, the archives of Edinburgh generated during in the lifetime of Maria Short similarly resound with female voices. With husbands fighting in overseas wars or otherwise absent, the Short women litigated and defended—made property claims, battled for legal recognition, and fought for economic support. There are vivid

self-portraits drawn by Maria Short's letters (Appendices B and C) and testimonies by her mother Jacobina Short. Were such women as canny and indomitable as their archives suggest?

In place of archive fever, Farge describes its allure. She writes "To feel the allure of the archives is to seek to extract additional meaning from the fragmented phrases found there" (32). Meanwhile Steedman compares the Historian in the Archive to a reader of eighteenth-century epistolary fiction, finding intrigue in the lost or stolen letters supposedly composed for another. The frisson of the "unintended, purloined letter" is akin to voyeurism (Steedman 75). The bundle of testimonials prepared for the civil suit, the replies recorded by the census taker, and the parish registry of burials for the week—the writers of such fragments rarely, if ever, had a historical researcher in mind. In the absence of a definitive answer the question that brought me there, I compare the archive to the screen of a splendid camera obscura. A tangible picture of reality is perceptible, but it is an often inverted and distorted representation with a narrow and selected field of view. Something always lies beyond the screen and the view may be skewed and spun away. Nevertheless, the "narrative closure of biography" that finds its ends through the writing of individual lives, is a mode of thinking entangled with History that is difficult to resist (Steedman 147).

Microhistory

Replete with fragmentary portraits created by the long-forgotten voices held within them, archives open countless pathways for the narrating of histories studied up close and in detail. Such are the routes of microhistorians, and as I searched the archives for all I could find to tell the story of Maria Theresa Short, I found myself inadvertently following a similar approach. For unlike case studies that are selected to test generalizations formed in advance and with little heed to narrative, microhistories result from an inductive method. They expand outward from the apparent historical anomalies that signify hidden structures, and apply storytelling as an expository form. The approach gained traction with Italian *microstorias* written in the mid-1970s as a response to the modernist, abstract, and ethnocentric macrohistorical approaches of Fernand Braudel and the Annales school, although a reduced scale of analysis and the term microhistory feature in earlier studies and share affinities with methods from other disciplines

(Ginzburg "Microhistory: Two or Three things that I know"). The method of clues advocated by microhistorian Carlo Ginzburg in his 1980 text "Morelli, Freud and Sherlock Holmes: Clues and the Scientific Method" resonates with my frequently relentless commitment to tracking information from bundle to bundle. Though many might caution against a loss of focus associated with going down potential rabbit holes, I find that investigating the revelation that emerges from an unnoticed detail enlivens historical research in an irresistible manner and the sensation of successful detection can be addictive. Such is the experience of the Archive's allure or fever.

Some microhistorians investigate specific events and places but as with my research, many focus on curious characters with remarkable stories that they reconstruct from archival documents.[5] For example, landmark texts based on trial papers such as Carlo Ginzburg's *The Cheese and the Worms* (1976) and Natalie Zemon Davis's *The Return of Martin Guerre* (1983), feature protagonists that, like Maria Short, stand accused of bad behaviour.[6] Conforming to neither Great Men nor Hero-Worshipping versions of history—which as I discuss in a later chapter are traceable to lectures in 1840 by Thomas Carlyle, another Scottish aficionado of camera obscuras—newer forms of biography do the similar work of recovering the lives of people with little or no power or influence, but with key differences in approach and intention. Identifying four ways that biography and microhistory differ, Jill Lepore explains: 1) biographies tend to focus on the singularities of an individual's life whereas microhistories are more likely to explore a life as an exemplary that reveals something about its broader context; 2) biographies often concern complete life stories, whereas microhistories focus on smaller, more succinct questions with an emphasis on solving mysteries; 3) biographers worry about betraying their subjects, but microhistorians are more likely to betray or contradict historical figures that have left larger or more records; and 4) biographers identify with their subjects whereas microhistorians more often find alter egos in figures that act as investigators or judges. In other words, "The life story, like the mystery, is merely the means to an end—and that end is always explaining the culture" (Lepore 133).

The culture that my microhistory seeks to reveal lies at the intersection of women, exhibition technology and observatory science in the first half of the nineteenth century. It explores the lives of Maria Short and to some extent her mother and other middle and working class women in nineteenth-century Edinburgh, and how they pursued livings founded on optical instruments, observatory building and popular spectatorship. One mystery I have tried to unravel is whether Maria Short was an impostor, and another is whether the deployment of her splendid camera obscura perpetuates or disrupts the patriarchal and disembodied model of vision commonly associated with the optical principle it applies. Yet when I don my deerstalker hat, more often than not, I pursue questions of a more modest sort. I see a name on a letter and wonder how did that person come to be connected to Maria Short? Who else did they know? Did their relationship continue? What other concerns did they have at the time? Even though they are frequently unanswerable, small queries are simple enough to pursue. However, tying bits together into an account that may have more than local meaning poses considerable challenges.

Historian Jacques Revel proposed a maxim for microhistory in his introduction "L'Histoire au ras du sol" to the French translation of Giovanni Levi's *Le pouvoir au village*, cited as an early attempt by a non-Italian scholar to theorize the approach (Trivellato 124). Exhorting historiographic complexity, Revel proclaimed "Pourquoi faire simple quand on peut faire compliqué?" (xxiv). And yet, why wouldn't one opt for a simpler path? A deductive method that progressively narrows in focus seems far less onerous than the microhistoric approach of outward expansion. Yet contending that the small can be fruitful, as Levi explains. "the unifying principle of all microhistorical research is the belief that microscopic observation will reveal factors previously unobserved" ("On Microhistory" 97). He moreover continues,

> Phenomena previously considered to be sufficiently described and understood assume completely new meanings by altering the scale of observation. It is then possible to use these results to draw far wider generalizations although the initial observations were made within relatively narrow dimensions and as experiments rather than examples (98).

The challenge and contribution of the microhistorical approach is the linking of micro to macro phenomena—measurements that are both spatial and temporal. In Matti Peltonen's

assessment, the "most interesting aspect" of Ginzburg's studies is the "collision of the exceptional event with the long historical structure of popular culture" (350). Focusing on the micro-macro link, Peltonen cites three approaches that are especially effective if collectively applied. Two approaches come from scholars not normally associated with microhistory—namely, Walter Benjamin and Michel de Certeau. From Benjamin, Peltonen takes the *monad*, citing the preface of Benjamin's failed dissertation from 1928, which drew from Leibniz in stating "The idea is the monad—that means briefly: every idea contains the image of the world" (qtd in Peltonen 355). Peltonen observes that Benjamin continued this line of thought with his Passagen-Werk project, with the Parisian arcades standing as a miniature model of the modern world. In the monadic sense then, Short's Observatory and the camera obscura within it become stand ins for epistemic transformations of vision—from science to spectacle—in the nineteenth-century in its development as a disciplinary society. In other words, despite its relatively narrow, personal and localized focus, my study concerns widespread societal changes that conditioned, and were conditioned by, modernity in the Western world.

From Certeau, Peltonen suggests the study of "marginal areas and borderline phenomena" since they have "clear relationships with their 'mother areas' or central places" (353). Although Maria Short, her installations and the other women of my study are historiographically marginalized, I would argue that their relationships to the centre (political and scientific authorities) is far from clear. However, that ambiguity and the agency they expressed in applications of that ambiguity merit consideration. Peltonen omits mention of Certeau's *Practice of Everyday Life*, yet temporal "making do" tactics that respond to dominant strategies, and "spatial practices" of city walkers that contrast with cartographic points of view represent other forms of micro-macro relations relevant to my study. Certeau's contrasts ground-level pathfinding with aerial representation, operations in urban space that he compares to writing versus reading (92-3). With splendid camera obscuras watching the denizens of the city from above, such practices seem particularly relevant. Maria Short nevertheless complicates this dichotomy by adopting a bottom-up/from the margins approach that appropriates and threatens to overwrite the dominant "solar Eye" (Ibid).

The “typical exception”, the “exceptional typical” and the “exceptional normal” refer to an idea articulated by historian Edoardo Grendi, that is most often used to describe how microhistories theorize the micro-macro link (Peltonen 356). Whereas the “normal” may refer to dominant, accepted and expected understandings, the “exceptional” represents the phenomenon (individual, object, or event) that “does not quite fit” (Peltonen 348-349). The exceptional includes both a middle-class spinster operating optical media in nineteenth-century Edinburgh, a city and practice dominated by scientifically-minded men, and her splendid camera obscura, as a historiographically marginalized application of an age-old phenomena. Yet the “exceptional normal” is perhaps best understood as processual rather than as a stable state, with the shift from micro to macro as a qualitative transformation that conveys changes in meanings, and not only scale (Peltonen 357). In other words, as starting points that emerge from microanalysis, extreme or marginal cases present the possibility of redefining boundaries and generating new understandings when they are treated as monadic guideposts to larger patterns that were previously hidden or overlooked. For example, a closer look at Miss Short and her devices reveals that other women also operated optical media, and that realization brings attention to bodies and instrument-based interactions, as well as notions of gender, class and space. Broader accounts that ignore or marginalize women—especially in relation to camera obscuras—generally omit such considerations. It should therefore be noted that Maria Short may not have been quite as exceptional as she appears. Rather, it may simply be due to the documented nature of her struggles—as a subject of legal and municipal disputes—that enables her to bring a set of broader trends to light.

This study may have a microhistorical core composed and carved from archival material, but it is wrapped in contextualizations assembled from contemporaneous commentary, already published historical research, and theories from studies of visual culture. While large scale trends and transformations (such as imperialism, colonization, abolition and emancipation, industrialization, urbanization, church disruption, the emergence of working class consciousness, etc.,) would have directly and indirectly affected the subjects of this study to varying degrees, I have tried to limit my research to select areas of inquiry, based on locale and concerns referred to in my primary sources. This study references, in particular, histories of

British astronomical science, studies of scientific spectacles, and social histories of Edinburgh from the late eighteenth to early nineteenth centuries, especially pertaining to women, the University of Edinburgh, the emergent middle class, scientific culture, and social and urban space. Verbose and influential commentators from nineteenth-century Edinburgh, namely Lord Cockburn and Thomas Carlyle, act as chosen foils because of their direct encounters with some of the people, places, and issues concerned, and because recent theories recall their opinions regarding science, space, and visuality. Observation, disciplinarity and camera vision play significant roles in conceptualizations of knowledge and its association with power. As theories connected to vision and visuality and others that correlate with my objects of study, my research also draws from surveillance studies and sensory studies. Except for the following chapter, which focuses on existing camera obscura literature, most of my sources are referenced in context throughout the text.

II. Literary Visions

Re-viewing the camera obscura

Meaning dark room in Latin, the term *camera obscura*, first recorded in 1604 by Johannes Kepler in *Ad Vitellionem Paralipomena*, conflates any number of devices, and with them, the fundamental optical principle they spotlight (see figure 1, for examples). Light focused through a small aperture or lens, which then travels into a darker space, will project a real time and inverted mirror image onto any surface that interrupts its path. With the effect harnessed by multiple configurations of various sizes for different applications over countless generations, the term encompasses and conflates numerous types—including astronomical instruments for solar observation, wondrous displays by natural magicians, and reflex box cameras designed for tracing as well as looking. Since the splendid camera obscuras of this study are later examples that incorporate features of older devices, a starting point for their study comprises an investigation of the overarching category alongside its historiographic treatment. Examining this longer history situates nineteenth-century developments in relation to earlier deployments, and contextualizes their status as scientific spectacles within a trajectory that

includes applications for diverse purposes and with different understandings. Moreover, an exploration of previous accounts of the camera obscura may help explain why most scholars overlook its splendid forms.

The earliest cameras obscura were simple room-sized affairs that implemented direct projection—meaning, entering light converged into focus by travelling through a small hole and produced a relatively dim, inverted image on the opposite surface (figure 2). As Ann Friedberg explains, "The optical principle of the camera obscura performs an architectural exchange, the wall exchanges place with the window" (*Virtual Window* 61). Such configurations are typical of pinhole cameras, which produce images with deep, almost infinite focus. Yet motion blurs may obscure their extensive depths of field, because making pinhole imagery visible through photography often requires long exposure times to accumulate sufficient quantities of light to record an observable image. Although they narrow the range of focus and cause various distortions and optical artefacts, the introduction of lenses and mirrors to pre-photographic cameras at the end of the sixteenth-century prefaced the instrumentation of modern devices. Lenses focus larger beams of light, thereby enabling brighter (or in other words, more splendid) projections, and in combination with mirrors and lenses of varying shapes they can redirect and reorient views. Whereas only room-size cameras obscura existed before the end of the sixteenth century and returned to fashion only centuries later in their splendid form, the interim saw the increasing prevalence of the "mobile camera obscura with an external observer" (Delsaute 111). With the seventeenth and eighteenth centuries came the production of personal and portable versions, and the popularization of camera obscuras developed into a "craze" that generated a variety of forms—sedan chairs, tables, books, goblets and so on—many of which, shifted the position of users from inside a dark room to outside a black box (Gernsheim and Gernsheim 15). The introduction of splendid cameras obscuras at the beginning of the nineteenth century may have drawn on the popularity of personal instruments from the previous era, but they offered an alternative, more public experience. While taking advantage of modern optics and mechanics—in effect, lenses, mirrors, and precision, movable parts—they marked a return to room-sized arrangements that housed multiple spectators who could simultaneously share onscreen visions.

Awareness and applications of the camera obscura effect may permeate far greater swaths of time and cultures than most histories imagine, since a leakage of light can turn any unlit space—a tent, a cave, the thick of a forest—into a projection device.[7] The splendid camera obscura is at once a modern arrangement that descends from generations of technical exploration and the outcome of a natural phenomenon that has no origin. Camera obscura histories commonly span two and a half millennia, with their chroniclers ascribing the earliest descriptions of its optical principle to the Chinese philosopher Mo Ti (470-391 BCE). The oldest records of the camera obscura effect outside of Asia appeared one century later in "Problems connected with mathematical theory" (Book XV of *Problemata*), attributed to Aristotle (384-322 BCE) and his followers. While Asian scholars reported observations of illuminated moving pictures projected into dark spaces, it is worthwhile noting that the first Western records refer to solar projection—images of the sun—with no mention of enclosure. The Aristotelian text ponders the appearance of sunlight filtered through "wicker-work" and the view of an eclipse through a "sieve," any "broad-leaved tree" or "two hands with fingers interlaced" (E.S. Forster 1927, 911b6, 912b11). The contrasting brightness of the sun would have facilitated these observations, eliminating the necessity for a dark room or lens to augment the projection of a less luminous image.

Records of the camera obscura effect otherwise remain relatively sparse with only a handful of known studies by Hellenic, Arab, and Chinese scholars predating the thirteenth century, when the progenitors of European optics acquired the Latin translation of *Kitab fi'l-Manazir* (*De aspectibus or Perspectiva*), a tenth-century treatise on optics by the mathematician astronomer Abū ʿAlī al-Ḥasan ibn al-Ḥasan ibn al-Ḥaytham (aka Alhazen, c965-1040). That knowledge transfer initiated a cumulative corpus of treatises and designs, which accelerated in frequency over the next six centuries to constitute what became the primary sources of camera obscura history. Photography historians Helmut and Alison Gernsheim contend that "[k]nowledge of the camera obscura was in all probability fairly widespread among Arab scholars" in Alhazen's time, and further posit that English philosopher Roger Bacon (1212-1292), who authored the first known European elaboration, "may well have taken knowledge of the camera obscura's elementary principle for granted" (17-18). Nevertheless, theorizations of the effect and its

refinement into instruments for observation, demonstration, image production, and exhibition, drew contributors operating across multiple and diverse fields that would later be categorized as astronomy, art, natural magic, optics, and philosophy. Prominent discussants include Johannes Kepler (1571-1630), Leonardo Da Vinci (1452-1519), Giambattista della Porta (1535-1615), Robert Boyle (1627-1691) and Rene Descartes (1596-1650). Moreover, the use of the devices by "showmen and religious charlatans in the service of a more-or-less dubious range of causes" could not be strictly divided from practices associated with "mathematical science or devout religion" (Kemp *The Science of Art* 191). Since there are no extant examples of camera obscuras—"not even a single part of one"—that predate the eighteenth century (Lefèvre 5), writings and texts by early modern thinkers are essential to understanding its early history.

Chronicling the development of devices across centuries or conflating them into theoretical abstractions, histories of the camera obscura generally avoid the specificities of particular deployments or detailed considerations of historical context. Yet a selection of camera obscura histories written over the past seven decades can themselves be historicized and sorted almost chronologically into overarching concerns that further explain how and why most overlook what my research addresses—women and splendid camera obscuras. I roughly categorize investigations of the camera obscura according to three types of application: inscriptive, discursive, and exhibitionary. By inscriptive, I refer to efforts to directly or indirectly translate its projected imagery into an immutable, still form—including cinematographic processes since they capture movement in sequences of individual frames. The earliest and largest group of modern camera obscura histories address this concern. Initiated in the mid-twentieth century and focused on technological development, such studies are generally situated within histories of drawing, painting and photography. These are complemented, informed, and challenged by the discursive histories that first began to emerge a few decades later. Investigations of its metaphoric invocations and cultural meanings attend to the observation by Friedberg that, "the camera obscura acquired the discursive weight of metaphor, and over centuries, its identity as a philosophical paradigm developed alongside—although somewhat separately from—its use as a technical apparatus" (*Virtual Window* 60). Research that explores inscriptive and discursive applications however tends to focus on European men as inventors, old masters, and

philosophers—those most likely to leave behind readily accessible records. Therefore, the histories they generate rarely feature women, the working classes, other cultures, or any historically and historiographically marginalized groups or individuals.

Presenting the projections of the camera obscura as either veridical or ideological, positions photography as its natural successor. Sharing discourses of truthfulness and deceit. Lorraine Daston and Peter Galison observe,

> Eighteenth century atlas makers such as the anatomist William Cheselden had used the camera obscura without forsaking truth to nature, yet the bacteriologist Robert Koch was one of the many late nineteenth-century scientists who turned to the camera obscura image fixed by the photograph to enforce mechanical objectivity. The same device could be and was turned to different epistemic ends (*Objectivity* 197).

It may be due to such conflations that chronicles of the camera obscura tend to end in the first decades of the nineteenth century, with uses and transformations that occurred during and after photography's invention being forgotten or ignored. That places splendid cameras obscura as being too late for inclusion in numerous camera obscura histories, and that may explain their absence in studies that explore uses of the camera obscura as a form of entertainment. The final category, which is where I situate my study, comprises research that originates in the mid1990s. Based in a range of fields—such as media history, film studies, and the history of science—a number of accounts explore its place in histories of pre-cinematic and scientific popularization as exhibitionary and pedagogical practices that incorporate optical media. However, they feature its application by natural magicians from the seventeenth century and itinerant lecturers and instrument makers of the eighteenth century making few, if any, remarks on later displays. Instead they are more likely to situate the camera obscura in relation to the magic lantern, a projection technology they describe as more closely related to cinema, by its chronology and as a replayable and scripted form of entertainment (for example, Kittler 70; and Friedberg *Virtual Window* 70, 195-197). A reliance on older accounts may explain this oversight, for a historiographic timeline suggests that what is previously studied structures the research that follows. If earlier investigations establish and act as sources for subsequent studies, then those later accounts may perpetuate tendencies to neglect later and alternative deployments.

Inscriptive

When perspective, painting, photography and cinema are imagined as a wish to inscribe the image of the camera obscura, a narrative of technological development towards visions of a certain kind of realism takes hold and reduces the camera obscura to a forerunner, component or production aid. The first scholarly accounts of the camera obscura appeared in the mid-twentieth century and for decades afterward, historians explored the relationship between the device and the recording of its imagery—a preoccupation that, sometimes to the exclusion of other considerations, persists. One example is the opening "prehistory" chapter of *The History of Photography from the Camera Obscura to the Beginning of the Modern Era* by Helmut and Alison Gernsheim, originally published in 1955. The Gernsheims write, "in 1685 the camera was absolutely ready and waiting for photography" (15) and they end their chronology in 1807 with the prism-based *camera lucida* drawing instrument that, as the Gernsheims explain, is "*not* a camera at all" (19). While calling for an expansion of the "investigation of photography's beginnings by critically examining the historians that invented them" (26), Jessica S. McDonald describes the Gernsheim text, alongside Beaumont Newhall's *The History of Photography from 1839 to the Present Day* (1964) as "foundational histories of the medium" (23) While Madonald traces the Gernsheims' identification of "the first photograph" by Niepce, a claim the contradicts Newhall, it is notable that both the Gernsheims and Newhall recite the history of the camera obscura in the openings of their texts, giving it primacy in the invention of photography, over a history of chemistry. That tendency continues in *The Miracle of Analogy: or the History of Photography, Part I* (2015) by Kaja Silverman.[8] Although Silverman proposes an alternative, analogical conception of photography, her text also opens with a chapter devoted to the camera obscura. Yet the association has arguably existed for almost two centuries. Its first users referred to the photographic camera as a camera obscura, and Fox Talbot described the use of a box-type camera obscura for his invention of the calotype in *The Pencil of Nature* (1844-46), after being frustrated by attempting to draw with a camera lucida.[9] While the camera obscura would have been relatively common in the time of Talbot, Daguerre and Niepce, their biographers helped reintroduce the device to readers in the twentieth century.

Art historian and curator Heinrich Schwarz, who published a 1949 essay called “Art and Photography, Forerunners and influences,” wrote in 1974, “a few years ago, when actual cameras obscura were first used in illustrating art-historical lectures and papers, they were hardly known and rather startling.” (“An Eighteenth-Century English Poem” 129).[10] Schwarz pioneered studies of painting and drawing in relation to photography and science, and participated in the long-running debate about Johannes Vermeer (1632-1675) that revived the nineteenth-century theory that the Dutch artist used a camera obscura for painting. The debate’s revival initially comprised a series of articles in the 1960s and 70s, which generated another set of texts that recount the history of the camera obscura.[11] Despite evidence of camera obscura usage as a drawing aid by surveyors, travellers, hobbyists and later artists and the presence of painted lens-based aberrations, nothing definitive (such as manuscripts, preliminary sketches or extant devices) exists that might settle the controversy. Vermeer’s contemporary and countryman, Samuel van Hoogstraten (1627-1678) in his treatise on painting—*Introduction to the Academy of Painting, or the Visible World* (1678)—describes seeing camera obscuras displayed by Jesuits in Vienna and in London, and recommends them to young artists, “for besides acquiring knowledge of nature, one also sees here the overall aspect which a truly natural painting should have” yet makes no mention of actually using an optical aid (qtd in Brusati *Artifice and Illusion* 71). Svetlana Alpers argues in *The Art of Describing* (1984) that the visual mode of Dutch paintings is inspired by artists’ engagements with optically-produced imagery and not necessarily through direct application. She suggests that the painting of optical artefacts in Dutch art may result from admiration, and not direct transcription.

Alongside the optical aesthetic acknowledged by art historians such as Alpers, researchers still look for material proof of direct application by old masters. Contributors to *Inside the Camera Obscura – Optics and Art under the Spell of the Projected Image* (2007), edited by Wolfgang Lefèvre, explore the technologies of seventeenth-century optics, instruments and paintings despite the challenge that no devices from the period exist. While these studies make valuable contributions as well-informed and scholarly explanations of camera obscura technology, they do not match the glamour of the 2001 publications that report on experiments made by their authors to prove the use of optical devices by artists long recognized as virtuosos. *Vermeer's*

Camera describes how architect Philip Steadman reconstructed the artist's studio to scale and installed a camera obscura to photographically recreate painted compositions by the Dutch master, whereas the author of *Secret knowledge,* artist David Hockney drew with optical instruments to account for the sudden stylistic shift in Renaissance representation, and the distortions he observed in baroque painting. Hockney argued that old masters such as Ingres and Caravaggio used lens-based drawing aids much more than had been previously considered. Drawing considerable media attention and inspiring other experiments (for example, the 2012 documentary *film Tim's Vermeer,* which chronicles the attempt by pioneering animation and visual effects software engineer Tim Jenison to replicate an old master), Steadman and Hockney use material practice as an art historical method, and in doing so highlight the technical affordances of optical devices, as well as their limitations.[12]

Filmed documentation of Hockney's and Jenison's experiments show that along with the challenge of an artist having trouble seeing and working in a dark room, motion in a projected image is generally an unwanted quality that hinders its tracing by hand. As with the long exposures of early photography, the stillness of the subject (the subject must sit still!) is an implicit condition for manual still image-making that uses live models. The prehistory of photography and the Vermeer debate have therefore shaped understandings of the camera obscura in three ways that my account of splendid cameras obscura attempts to undo: 1) they focus on use by a relatively small contingent of celebrated male artists and inventors; 2) they consider only applications before the nineteenth century; and 3) they minimize the spectacular aspects of its projected moving picture. In other words, my investigation calls into question the "familiar and reductive teleologies that form the core narratives of modernism and photography," a questioning that Friedberg credits Jonathan Crary with initiating (*Virtual Window* 284n38).

Discursive

Techniques of the Observer (1990) by Jonathan Crary opens with a discursive history of the camera obscura that has "profound implications" for art history, film studies and visual culture in general, through its historicization of vision (Williams *Viewing Positions* 7). My first reading of

the landmark text initiated this study. For had I not read Crary on a plane to Edinburgh in 2010, I might never have visited the city's walk-in device and read enough about its feisty founder in its lobby to impel me to learn more. My experiences of the device and its history have since challenged my understanding of Crary's text. For that reason, I explore his critique here, and return to Crary in a later chapter as I attempt to unpack relations between nineteenth-century discourses of the body and what I uncovered in the course of my research.

Positing a paradigmatic break in dominant understandings of vision and ontology in the first decades of the nineteenth century, Crary argues that "a massive reorganization of knowledge and social practices" (3) took place when embodied vision, which he claims the Victorian stereoscope characterizes, supplanted the internalized, detached understanding of vision associated with the camera obscura in previous centuries. He writes,

> During the eighteenth and seventeenth centuries, the camera obscura was without question the most widely used model for explaining human vision, and for representing the relation of a perceiver and the position of the knowing subject to an external world (27).

Implicitly referencing the method outlined by Michel Foucault in *Archaeology of Knowledge*, Crary cites the "*regularity* and uniformity with which the formal relations constituted by the camera are *stated* again and again" (30, original emphases). In particular he cites perceptual and epistemological theories by Newton, Locke, Descartes, and Leibniz that posit an interiorized observer isolated from the outside world (40-56). He moreover argues that in the 1820s and 1830s, "the regularity of such statements ends abruptly" (32). Other discursive histories of the camera obscura—namely *The Camera Obscura of Ideology*, originally published in French in 1973 by Sarah Kofman, and a chapter by John D. Lyons that appears in *Convergences: Rhetoric and Poetic in Seventeenth-Century France* (David Lee Rubin and Mary B. McKinley, eds., 1989)—support Crary's thesis. Kofman explores how nineteenth-century thinkers such as Marx, Freud and Nietszche used the camera obscura metaphor in distinct and different ways: as the ideological inversion that promotes commodity fetishism; as a photographic analogy for the negative-to-positive passage from the unconscious to the conscious; and as a painter's eye that claims transparency, but when deconstructed reveals the relative and situated nature of every point of view. Kofman furthermore observes,

> Moreover from 1840 on, it is known that light produces modifications in the sensitive layer of the retina (that of cones and rods), whose effect is a nervous influx towards the brain which acts within it a photochemical manner; the eye thus comes to be likened to a photographic apparatus, and the physical image is now a chemical impression (49).

In other words, there is a shift in understanding that relocates vision back into the body. While Kofman notes the vulnerability of the camera obscura model of vision to transformations in scientific knowledge, she asserts that Cartesian theory is immune as a model that places "perspectivist images at the back of the eye." Nevertheless, her argument does not dispute Crary's assessment of Descartes's use of the camera obscura as a model for interiorized and disembodied vision. As his chapter title "Camera Obscura: Image and Imagination in Descartes's Meditations" indicates, Lyons explains in detail how the French philosopher modelled his notion of an internal "mind's eye" and its ability to assess its image of the external world after the device's workings.

Crary, Kofman, and Lyons discuss its metaphoric uses by only well-known philosophers, yet a multiplicity of meanings that nineteenth century Scottish journalists invoke through the term *camera obscura* supports Crary's main thesis. Along with discussions of cameras obscura and photographic cameras, everyday writing also identified the device as a kind of shorthand to describe and explain less recognizable technological and experiential phenomena. For example, the motion picture aspect of the device likely inspired its usage in at least two travel narratives. In April 1819, *Scots Magazine* published an account that began "Constantinogorsk resembles at present a camera obscura, in which all sorts of people pass before us…all thrown together in the most fortuitous and varied confusion—an interesting spectacle!" ("On the Missionaries of the Caucasus" 323). Twenty-six years later, a reporter for *The Scotsman* inverted the relation of looking between tourist and local, commenting on the "immense" doors and windows of Rotterdam houses on a voyage up the Rhine and imagining that "figures of the passersby, are served up as in a Camera Obscura for the amusement of the Dutch ladies" ("Voyage up the Rhine" 26 July 1834, 3). In technical journalism, an 1836 article from the same publication described a new railway lamp by asserting that objects within its thirty-foot diameter sphere of brightness showed "as distinctly as those on a table of a camera obscura" ("The New Lamp" *The Scotsman* 20 Feb 1836, 2). And almost two decades later, an editorial in the *Caledonian*

Mercury debated the alleged success of temperance legislation by arguing, "We believe the boasted improvements have as much reality as the landscapes in a Camera Obscura" (28 August 1855, 2).

I collected those references from the results of keyword searches in newspaper databases conducted primarily to locate information on Maria Short and the Edinburgh installations. However, I made note of such appearances, because I also observed that camera obscuras are never defined or explained in advertisements or reviews including for installations by Short or her competitors. This cannot be said of present-day exhibitions. A particularly telling allusion to the camera obscura appears in descriptions of submarine periscopes that date to around the turn of the twentieth century (Yorkshire Post, 11 Jan 1901; *The Scotsman* 6 Aug 1907). British journalists explained the then-new submarine devices by referring to the optics of a splendid camera obscura—its use of angled mirrors to bend light and redirect views that would otherwise be outside of its user's line of sight, as well as its ability to rotate the view full circle. More recent descriptions are more likely to invert the comparison, explaining the earlier technology in terms of the latter. For example, *Edinburgh's Camera Obscura and World of Illusions* describes the mechanics of its device as a "giant periscope," and a 1947 *Mechanix Illustrated* article called the splendid seaside camera obscura in Santa Monica the "Periscope House."[13] The chronological inversion for descriptive purposes, which I myself make, is useful in light of inevitable shifts in common knowledge. However, teleological slippages that foreground later phenomena, haunt histories of the camera obscura, threatening to narrow and eclipse understandings and applications by earlier generations. The variety of metaphoric invocations in contemporaneous everyday accounts suggests an assumption generally held by nineteenth century journalists that cameras obscura were not only broadly understood by the reading public, but also fruitful enough in their complexity to participate in a diverse range of discourses within the popular press. This therefore supports Crary's argument that by the second and third decades of the nineteenth century, the regularity of statements about camera obscuras had ended.

Could the proliferation of cameras obscura and their increasingly public accessibility have inspired the broader and more complex array of experiences and significations that my newspaper survey suggests? As I discuss in a later chapter, representations and deployments of splendid camera obscuras seem to align with the discursive shift towards bodies and embodiment that Crary claims followed. Rather than being wholly supplanted, nineteenth-century camera obscuras became common enough to appear in Edinburgh newspaper in sales of "household items"; their promoters cited ongoing improvements; and they still held enough interest for the promotion of treatises, journals and encyclopaedias that included lengthy descriptions of their operations.[14] Sharing the spotlight with new inventions such as persistence-of-vision optical toys, stereoscopes and photographic cameras, that Crary identifies as models for the newly corporealized vision, as John Hammond explains "during the nineteenth century the camera obscura reached the height of its popularity as a useful technical device and as an entertaining diversion" (104).

Camera obscuras may have been familiar, and perhaps even old-fashioned, to readers of early nineteenth-century British newspapers, however the main criticism of *Techniques of the Observer* is that Crary himself fails to attend to material or embodied experiences of such devices. For example, visual culture theorist W.J.T. Mitchell makes a lengthy discussion of the text in the first chapter of *Picture Theory* (1994), commenting on Crary's "failing to heed many of his own warnings about overgeneralization and categorical truth claims" (20). In questioning Crary's assertions regarding a "hegemonic set of discourses" and a "dominant model," Mitchell comments

> Dominant for whom? Hegemonic in what sphere? Sweeping across what social boundaries? Crazy cannot even ask, much less answer, these questions because he shows no interest in the empirical history of spectatorship, in the study of visuality as a cultural practice of everyday life, or in the observer/spectator's body as marked by gender, class or ethnicity. "Obviously," he says, "there was no single nineteenth century observer, no example that can be located empirically". The first half of the sentence is obvious and true; the second half is quite false, if by it Crary means that we can have no access to examples of spectatorship—what people liked to look at, how they described what they saw, how they understood visual experience, whether in pictures or the spectacles of daily life (20-21).

A more recent criticism of Crary's text concludes one of the few books devoted to the camera obscura, *La Camera obscura: Philosophie d'un appareil* (2010) by Martine Bubb. Arguing that the camera obscura is an apparatus and therefore able to structure belief, Bubb summarizes its discursive deployments alongside its technical history from the ancient Greeks onward. Presumably, her survey of camera obscura discourses should support Crary's thesis. However, Bubb's text concludes with "La camera obscura, au-delà du "dispositif foucaldien" proposé par Jonathan Crary dans L'art de l'observateur," an article also published in *Appareil* in 2008, in which she makes "une critique point par point" (436). To summarize, Bubb asserts that Crary erases technical aspects too quickly in favour of epistemological concerns ("Les aspects techniques sont vite gommés, chez J. Crary, au profit des implications épistémologiques," 438) and in ignoring its improvements (for example, the addition of lenses) and the optical artifacts that result, he conflates the camera obscura with Renaissance perspective. In other words, Bubb accuses Crary of repeating a mistake also levelled against apparatus film theorists. In her study of screen technologies, *The Virtual Window* (2006), media theorist Anne Friedberg draws attention to the claim by Jean-Louis Baudry in "The Ideological Effects of the Basic Cinematic Apparatus" (1970) that the "camera obscura coincides exactly" with the birth of Western Science and "will serve in the same period to elaborate in pictorial work a new mode of representation, *perspectiva artificialis*" (qtd in *Virtual Window*, 74-75). While Friedberg outlines the protest by Hubert Damisch of the ideological conflation of perspective and camera obscura within cinematic apparatus theory (Ibid, 76-78), it is her critique of Crary that is embedded in her extensive discussion of camera obscuras that interests me here.

As Friedberg notes, Crary draws "an explicit distinction between the effects of the camera obscura and linear perspective" (65). Crary writes, "Obviously the two are related, but it must be stressed that the camera obscura defines the position of an interiorized observer to an exterior world, not just to a two-dimensional representation as is the case with perspective" (34). Nevertheless, in tracing the technical history of the device in his *Camera Obscura: A Chronicle* (1981), John Hammond documents the seventeenth and eighteenth-century proliferation of handheld camera obscuras, as well as the re-emergence in the early nineteenth-century of room-sized installations, and his chronicle troubles the chronology and the

interior/exterior (and decorporeal) relation at the core of Crary's argument. Crary places his model observer inside the camera obscura before the 1820s and 30s and not the other way around. According to Friedberg, two models of vision (disembodied and embodied) are meant by Crary to combine in "cinematic visuality," which she contends is "a visual system more complex than Crary's model of rupture and discontinuity might suggest" (68). She furthermore states

> Here is seems that Crary's model of two successive epistemes—seventeenth/eighteenth century versus nineteenth—becomes nearly as reductive as the model he criticizes. Crary's dismissal of the coexistent and continuous use of the camera obscura model of vision—through the nineteenth century and well into the twentieth-first—effectively obscures the importance of the projective tradition of the camera obscura, of the architectural model of visuality and its place in the production of virtual images (Ibid).

Exhibitionary

The camera obscura is primary to histories of media that identify its central features as the moving image and projection of light. Friedberg explains that its "image of movement was distinctly separate from its source, it was *virtual* movement watched by an immobile viewer" in response to Crary's observation that, "Many contemporary accounts of the camera obscura single out as its most impressive feature its representation of movement" (original emphasis in Friedberg 66; Crary 34). However, the camera obscura of the nineteenth-century has no place in Friedberg's account, nor is it present in other histories of media. Rather, as art historian Martin Kemp notes,

> Generally speaking, the camera obscura flourished best in late sixteenth century Italy in the context of natural magic, as a means of exploiting natural phenomena to astonish and entertain the spectator, rather than as a direct crib for painters (*Science of Art* 191).

The camera obscura that most often draws scholarly attention is the Renaissance device that appears in *Magia Naturalis*, which Giovanni Battista della Porta published in 1558 and expanded in 1589 to divulge secrets of both scientific and occult natures. On his presentation of a camera obscura, Della Porta wrote,

> To give pleasures to the gentlemen, there is nothing more ingenious and beautiful than viewing—on a white cloth, in a dark room—scenes of hunting, banquets, battles and plays, and, finally, seeing all the desirable images so clearly and luminously in such detail, that you feel as if

> you have them right in front of your eyes [...] The spectators in the room will see the [outside] trees, the animals, the faces of the hunters, and the rest of the apparatus in such a naturalistic way that they will not be able to judge if they are real or imaginary (qtd in Bruno, *Atlas of Emotion* 139-140).

Giuliano Bruno notes the "pre-filmic" nature of Della Porta's display—as a "public" performance with an architectural arrangement akin to cinema that moreover "involved a narrative structure, a set design, actors and even sound effects" (140). Because of "Della Porta's insistence on the 'counterfeit' and the 'pleasure to see such a deceit,'" Friedberg identifies it as a "device for illusion and entertainment" (*Virtual Window* 68). Explaining that the "camera obscura was crafted into a variety of forms" Friedberg shifts her attention to the magic lantern (Ibid). She writes, "it is precisely this 'counter-deployment of the camera obscura, the centuries-long tradition of projected images, that has been at the core of recent film historical writing and research" (Ibid, 70). In *Optical Media* (orig German 1999), Friedrich Kittler observes, "In essence, the *lanterna magica* simply turns the *camera obscura* inside out" although he identifies the bull's eye lantern as its "direct precursor" (70).

The Great Art of Light and Shadow: Archaeology of the Cinema (2000, orig French 1995) by Laurent Mannoni is a comprehensive text that, according to its second foreword by David Robinson, "represented a revolution in the study of the origins and prehistory of moving images" (xiii), and in its "Introduction," Tom Gunning describes it as "the work I believe most thoroughly and imaginatively redefines the shape of early film history" (xx). It opens with a chapter on camera obscuras and magic mirrors, which Mannoni identifies alongside the 'cryptologic' projections of text by the Jesuit natural magician Athanasius Kircher as the "earlier stages of the ancestry of the cinematograph" (28). While he describes the camera obscura of Della Porta as "almost superior" to the lantern show that arrived a century later, Mannoni explains the earlier device's shortcomings as follows:

> However, the camera obscura could offer nothing more than an ephemeral spectacle: at nightfall, its images vanished. Della Porta's productions must also have been very costly and difficulty to assemble. The sun had to be out to illuminate the scene, and the scene had to remain within the field of view of the lens (9).

As Bruno also outlines, Della Porta's show, like the magic lantern, allowed for narrative constructions that are akin to classical cinema, a characteristic that may also account for the interest they draw from cinema scholars.

As non-narrative devices that did not display pre-arranged, repeatable performances, splendid camera obscuras nevertheless share with nineteenth-century media and film, the contingent quality that Mary Anne Doane identifies in *The Emergence of Cinematic Time* (2002). Doane discusses a preoccupation with instability and indeterminacy during that century, which she asserts emerged alongside theories of thermodynamics, statistics and psychoanalysis. She connects that interest (and anxiety) to chronophotography, as well as the two apparently divergent forms of early cinema: the trickfilm exemplified by the work of Georges Méliès; and the single shot "event" films of the Lumière brothers. So while Andre Gaudreault and Tom Gunning characterize early cinema as a technological spectacle (see Strauven "Introduction to an attractive spectacle"), Doane explains that it also recorded and expressed chance happenings, like the kind that a camera obscura visitor, or any spectator of a live viewing, awaits. In other words, as participants in "the emergence of cinematic time," splendid camera obscuras belong to a category that is distinct from the pre-planned camera obscura displays by natural magicians. Near the end of this thesis, I discuss splendid camera obscures as embodied phenomena embedded within a nineteenth-century context, but I conclude here with their presence in existing studies.

Splendid

While uses of camera obscuras after the turn of the nineteenth century are absent from most accounts that include a history of the camera obscura, they are present in at least two monographs devoted to the subject, and one is commonly referenced. Martine Bubb's 2010 *La Camera Obscura, Philosophie d'un appareil* is probably too recent to be extensively cited, however she does discuss later deployments of the camera obscura effect. Her examples include abstract landscape paintings by Gerhard Richter (b. 1932), which she explains invoke a conceptual camera obscura ("appeler une camera obscura conceptuelle"), whereas camera obscura bunkers by artist Gabor Ösz (b. 1967) and photographs of camera obscuras that

Alberto Morell (b. 1948) creates from furnished rooms make actual use of the optical phenomenon (422-428). Bubb does mention nineteenth-century tower camera obscuras (and in particular, the present device in Edinburgh), yet only within a chapter identified as being about seventeenth-century on Dutch art, even though she identifies them as nineteenth-century installations located in American and English cities (169-171, images on 196).

References to camera obscuras like those of my study are more easily found in *The Camera Obscura, A Chronicle* (1981) by John Hammond, a title that appears among the bibliographies of a numerous accounts, including the texts I've discussed by Crary, Friedberg, and Mannoni. With chapters structured chronologically by century, except for an interlude that examines uses of the camera obscura for painting and drawing, Hammond draws from numerous archival texts, illustrations, and extant objects to describe a series of devices, including variations from the nineteenth and twentieth centuries. Hammond writes in the first paragraph of his chapter on the nineteenth century, "The large room-type camera obscura became an attractive entertainment and many were built in gardens, parks and at holiday resorts" (104). However, except for a mention of seaside camera obscuras in that chapter's appendix (135-138), the installations that I would refer to as "splendid", Hammond classifies under the subheading "Observatories" (106-118).

In the opening paragraph of his chapter on the twentieth century, Hammond remarks "Camera obscuras are no longer built for public entertainment, but there is a current trend among museums to install camera obscuras in sections dealing with vision and optical aids for drawing" (143). Hammond's final chapter nevertheless lists additional splendid displays but also under the subheading "Observatories" (143-152). Therefore, his readers might easily mistake the room-sized camera obscuras that Hammond identifies in his last two chapters as scientific curiosities, rather than as popular spectacles. Had he added a "splendid" modifier to his terminology, the installations he describes might more readily be identified as forms of pre-cinematic amusement. Hammond, however concludes his book by stating,

> The portable camera obscuras of the eighteenth and nineteenth centuries have now become collector's items, and the amateur artist has taken instead to that 'linear descendant' the photographic camera. As an aid to drawing the camera obscura remains recognizable in its

> original form only in commercial art studios. In science and technology, lens projection systems bear little resemblance to the camera obscura, but on rare occasions a need arises for the more simple instrument. However, the large structural camera obscura remains unchanged and may even regain some of its original attraction as a popular sideshow. As an adjunct to tourism it has the charm of antiquity and the useful function of displaying a panorama of a town or countryside (160-161).

That TripAdvisor consistently ranks Edinburgh's Camera Obscura and World of Illusions among its top ten of "things to do in Edinburgh," signals an indication, among many, that Hammond's prediction came true. Lahabana.com, a Cuban tourist website explains that while the Havana camera obscura (a twentieth-century gift from the Council of Cadiz, Spain to the Havana City Historian's Office) is the "only one of its kind in Latin America and the Caribbean," and that it is "one of *74 worldwide* today" (emphasis added). The origin of that number is uncertain, but the "Magic Mirror of Life" section of brightbytes.com, a camera obscura site maintained by Jack and Beverly Wilgus, identifies numerous, international extant and modern installations, as well as lost camera obscuras and related ephemera. As with most other phenomena, the Internet facilitates finding and sharing information about camera obscuras, and online references and resources continue to accumulate. Each time tourists like the Wilguses (or me) visit a site, new enthusiasts are potentially born.

Hammond's interest in the camera obscura may well have arisen before ever walking inside a splendid camera obscura, but his passion for the topic is unmistakable and did not conclude with publication. A scientific photographer employed by the English Ministry of Agriculture, Fisheries, and Food, he conducted pre-Internet research by relying on old directories, travel guides, newspaper clippings, ephemera and correspondence, and was probably unable to crosscheck his sources. Instrument historian Gerald L'E Turner in reviewing Hammond's book describes it as "a chronicle based on secondary sources" that "leaves one wishing that this interesting subject had been dealt with more thoroughly and more coherently" ("Instruments and Measurements" 515). And indeed, Hammond's description of the Edinburgh camera obscura contains historical inaccuracies, even though at a span of four pages, it is one of his longest entries. Based on a few pamphlets and an old tourist guide, Hammond mistakes the Short that set up a camera obscura for the Short that founded the first Edinburgh observatory,

even though, as my next chapter outlines, the old optician had already long been dead (110). He also wrongly guesses that the instrument on Castlehill moved there from the Gothic Tower on Calton Hill, although he acknowledges, "dates and movements are somewhat confused" (111). Despite his mention of "a female descendant" (110), Hammond also misses the centrality of Maria Short in the history of the Castlehill device—an oversight the Veronica Wallace would correct a decade later.

Hammond nevertheless kept records of his research, which continued after he published his camera obscura book and shifted his attention to *The Camera Lucida in Art and Science* (co-authored with Jill Austin in 1987). Hammond gifted his notes to the Science Library and Museum at Kensington in London, where he conducted much of his research. That collection is now kept in the National Science and Media Museum in Bradford, UK. There, several binders contain correspondence and clippings related to various splendid installations that are lost, extant, or new, and many postdate Hammond's 1981 publication. Some answer older inquiries, whereas others respond directly to his publication.

Hammond's archive could therefore provide an interesting starting place for the researcher doing a study of international sites. However, he also accumulated more information in his files about the Edinburgh sites. Included in the binders are copies of the plans by the optical firm Barr and Stroud, which installed the assembly in the Edinburgh tower in the mid-20th century. Access to the plans would have facilitated Hammond's corrections to a technical information sheet sent to him by Ewan Small, the assistant manager of what was then called the *Outlook Tower and Camera Obscura*. On Small's letter dated June 28, 1988, which accompanied the technical sheet, Hammond inscribed "acknowledged with thanks to Mr. Hayes [Small's manager] 2/7/88." A number of pamphlets published by the Edinburgh site that date between 1981 and 1988 suggest that Hammond kept regular contact with its management and acted as an informal consultant. In the handwritten copy or draft of his reply to Small, Hammond writes

> I wish you had sent me a draft. As you are leaving in July, I do not propose re-writing it because of the treatment of the last piece of writing I did. You may remember my letter to you acknowledging the booklet. Mr. Hayes mentioned the engraving in his apology (n.d.).

The Hammond archive documents exchanges of information that standard citation practices do not easily capture. As touchstones for camera obscura researchers, the Edinburgh site and others like it have long acted as repositories and conduits for historical and technical information, both accurate and not.[15] I experienced this directly. As soon as I told him of my research, Andrew Johnson who manages Edinburgh's Camera Obscura and World of Illusions not only offered me a warm welcome and introduced me to his staff, he supplied me with digital copies of all of the material that they had gathered. Along with some of their own research, which includes transcriptions from *The Scotsman* newspaper digital archive, an image of a nineteenth-century entrance token found on eBay, a search of title deeds, and several historic photographs, they also gave me copies of Veronica Wallace's article and images that I later realized had been supplied to them by Jack and Beverley Wilgus. In turn, I have since given Mr. Johnson regular updates and digital copies of new materials as I uncover them, such as images of Maria Short's letters to Town Council, a copy of the record of death that proves that she passed away inside the tower, and pictures of Short's Observatory on Calton Hill. Moreover, in summer 2015, I participated in a staff training session where I presented an hour-long lecture on the history of Maria Short. They recorded, and transcribed the talk and sent it to me for corrections, along with a generous honorarium. How they incorporate my research matters little to me. I have yet to see a show there that isn't entertaining. In the spirit of Maria Short and the relational quality of a splendid screen show, I think it more important that its guides be able to improvise, vary and shape their presentations according to their audiences and their own whims.

Part Two: Picturing Willfulness

"To be identified as willful is to become a problem" (Ahmed Willful Subjects *3).*

The history that unfolds as the core of this thesis comprises the histories of Maria Short, her popular observatories and the splendid camera obscuras that overlooked the city of Edinburgh in the first half of the nineteenth century. As such, it is a history built on recovery. Retrieved from archival sources, it is also a history of wills and willfulness told in three acts that strips aside layers of neglect and misinformation that have long obscured the story of Maria Short and her venues. Its first act or chapter begins by undoing conflations between Short and her father and in doing so, locates the foundation of Edinburgh's Camera Obscura in the failed attempts of the eighteenth century to establish an astronomical observatory. In my effort to understand the connections between the projects of Maria Short and the activities of the generation of Shorts before her, this section shuttles between the year after Maria, a stranger in Edinburgh, suddenly made herself known as a claimant against the City, and the final decades of the eighteenth-century. I explore the misfortunes and some of their causes that led to Short's claims in 1828, which she outlined in four letters that are transcribed in the Appendix. Previous accounts have discussed the conflicts between Maria Short and Town Council, but they do not discuss how her parents and siblings suffered as a result of city negligence. Verifiable details of her life or its existence before the end of 1827 were previously unknown, and in documenting her early whereabouts, a nearly three-decade gap remains. However, I uncovered a series of judicial papers that detail some of the struggles that Maria, her sisters and their mother faced in the 1790s, and that these conflicts and hardships had lasting economic and emotional impact makes them all the more significant.

I gleaned untapped source material from Scottish archives in the course of trying to determine whether the woman who presented herself in 1827 was who she said—a question previously posed by two Wallaces. In 1828, William Wallace, the professors of mathematics expressed doubt about her identity, and in 1992, Veronica Wallace, Short's first biographer recorded similar misgivings. While a definitive proof of identity may never surface, the evidence that the woman who called herself Maria Short supplied in 1828 satisfied city magistrates and so they

acceded to her demands. They compensated her with a Great Telescope, which as I recount in the course of the following chapters became the basis for the venue that showcased her splendid camera obscuras.

In the middle section of this history, which is therefore the middle of this thesis, represents a turning point in the career of middle-aged Maria Short and so it is central in multiple respects. It spans the period between 1828 and 1834, a time when Short's ambition shifted from trying to dispose of her Great Telescope to earn enough income at once to indefinitely sustain her, to founding an exhibition of optical instruments as a potentially long-term business prospect. Campaign letters and promotional materials written by her and her champion, the shawl manufacturer Thomas Fleming outline Short's change in tactics. I pay particular attention to the language and references they used to address their audience. As with the section before it, secondary sources that explore the histories of women in late eighteenth to early nineteenth century Scotland help contextualize the actions of Maria Short as situated, in terms of gender (female), class (middle), age (older) and marital status (spinster), as well as in terms of time period and location. Work by scholars connected to Women's History Scotland, alongside social and demographic histories of Edinburgh and Scotland help frame the societal and economic conditions faced by Maria Short and women connected to her, and how they were understood by others.[16] Maria Short addressed her audiences both willingly and wilfully, and I rely on histories of science that focus on British astronomy and instrument-makers, Scottish university history, Romantic science and popularizers of science to understand whom she spoke to, how and why.[17] I cannot fully account for the failure of her first campaign, which apparently did not generate sufficient participation. However, it is intriguing that other archived documents reveal that around the time she decided to propose an exhibition, she associated with someone convicted of fraud for wrongfully collecting money on her behalf. Her associations with both respectable citizens and criminals further complicate the ambiguous status of Short and her projects.

My historical section ends with accounts of the Calton Hill popular observatories and splendid camera obscuras, which, besides Short's Observatory include two others that I uncovered in the

course of my research. Remarkably these installations also had working and middle-class women operating their devices. Their histories emerged from contemporaneous notices and reviews in local newspapers, travels guides to the city, and published tracts, while minutes of Town Council and the Astronomical Institution also document their progress. Incorporating the stories of these neighbouring installations, this section spans the decades between the 1810s to the 1860s. It moreover considers in particular the 1830s and 40s when Short's Observatory occupied Calton Hill, and so overlapped and competed with the other venues. While this chapter outlines the stories of three camera obscuras from their origins to their ends, I return to them in the final section of this thesis, in discussions of contemporaneous discourses and contemporary experiences that explore their potential for diverse understandings and modes of deployment. The conclusion of Maria Short's story can be found at the conclusion of this thesis. I have prepared a glossary of significant people and events to facilitate the reading of this chapter in particular. It appears after the end notes and before the bibliography.

I. Short Subjects & Battles of Will (1768-1828)

Conflations

The renaming of her Castlehill venue at the end of the nineteenth century marked the loss of Maria Theresa Short from history, despite the enduring reminder of her signature device. The building that she first opened to the public in 1855 as Short's Observatory maintained that moniker until the 1890s, when Patrick Geddes (1854-1932) bought, repurposed, and rechristened the site. Its tower, which Short constructed after purchasing the property in 1853, under Geddes became *Outlook Tower*, a headquarters for projects dedicated to the study and improvement of urban life. "A First Visit to Outlook Tower" is a 1906 guidebook that describes its splendid camera obscura as an epistemological tool for observing and understanding the city and its surroundings. It also recounts a history that long persisted despite, or perhaps because of, its spurious nature. Excluding women—notably mothers and grandmothers—the pamphlet recalls,

> Tradition indicates the building itself as the town mansion of the 'Laird of Cockpen'; but to our fathers and grandfathers it was known as 'Short's Observatory,' from the Edinburgh Optician of

> that name who first established the little museum of astronomical instruments and scientific toys which this succeeds (5).

Reducing her project to littleness, the author of the pamphlet may have masked the "Edinburgh Optician" because she was a woman or because her being a woman was beyond their consideration. Yet the misidentification may have also originated from incomplete research or earlier misinformation. The name Short appears once in the Outlook Tower dossier of the Geddes archive (US TGED 7/9/238). Among its haphazard notes and apparent scraps, there exists a single typewritten page that reads only,

> Edinburgh Evening Courant, 1776.
> April 20th. The Magistrates and Town Council granted to Mr. Short a lease of half an acre on the Calton Hill.

It seems possible, if not likely, that the Tower's 1906 guide confuses the Mr. Short of that transcription with the Miss Short of the Castlehill site. And that same error is repeated seventy-five years later by John Hammond, who cites the Geddes guide in his camera obscura book (110, 141n17). However, that the *Caledonian Mercury* described the Castlehill tower as "the reconstruction of the late Mr. Short's Observatory" when Maria Short opened it in 1855 (21 May 1855), and *Scotland's Magazine* repeated the claim a century later, suggests that the confusion was widespread and ongoing.[18]

The two Shorts in question are father and daughter—Thomas and Maria. However, unpacking the elision between them reveals more than a simple line of succession. The elder was Edinburgh's first observatory-builder, but died before the birth of the younger, and forty-seven years before the 1835 founding of her eponymous "little museum." Nevertheless, Maria Short drew on her familial connections to the previous, but long-dead generation of Shorts to advance her projects, so the successes and failures of her relations in the eighteenth century are significant to her story. This chapter outlines the early history of Miss Short, including the activities of her parents and uncle that led to her win against the City of Edinburgh and her late-in-life career as the owner and promoter of optical instruments.

The Great Telescope

I begin her history halfway through, when a middle-aged Maria Short reappeared in her hometown as a stranger. By some accounts, she had travelled to the West Indies in her youth and afterwards settled with a sister in Ireland (Mary Brück 21; Gavine 226). However, blaming the city of her birth for the hardships faced by her and her family, she returned to Edinburgh in 1827 to demand restitution. Her compensation was not a camera obscura (which she would acquire in the subsequent decade), but rather the Great Telescope (figure 7d)—a prized and powerful instrument, possibly never used but nevertheless central to early observatory building in Edinburgh, and as such, key to the troubled beginnings of Maria's life. As the basis for her popular observatory, which housed her splendid obscura, her retrieval of the instrument is vital to her tale. The twelve-foot Gregorian telescope once valued at £1200 and treasured for the superior optical quality of its metal reflector had sat for decades in City Chambers. It had been the basis for the city's first observatory, the failed project initiated by Maria's father, Thomas Short who had brought the instrument to Edinburgh from London after closing the workshop of its creator, his brother, the celebrated telescope maker James Short.

In order to understand the significance of the Great Telescope and how it led to Short's Observatory and eventually Short's splendid camera obscuras, it is essential to understand something about James Short and his three brothers. At the beginning of the eighteenth century, Margaret Grierson and William Short had four sons, who were orphaned by 1720.[19] Their eldest son John emigrated to Virginia and founded a dynasty of slave-owning planters, while the second and third sons Alexander and James remained bachelors and moved to London, setting up neighbouring workshops on Surrey Street.[20] Alexander specialized in woodworking, while James earned fame and fortune as a telescope-maker.[21] In addition to his appointment as a fellow of the Royal Society of London at age 27, James founded the Philosophical Society of Edinburgh alongside his mentor, professor of mathematics Colin Maclaurin (1698-1746) and his patron, the 14th Earl of Morton (1702-1768), and his elite clientele willingly paid more than double the going rates to own his telescopes.[22] As neighbours, James and Alexander cared for their nephew James junior, who had been sent to London from Virginia after the death of their brother John in 1764. Their youngest brother

Thomas also became an instrument maker, yet the relationship between him and his famously successful (and rich) older brother James may have been strained due to Thomas's incompetence or dishonesty.[23] Having married and settled in Leith (the port town attached to Edinburgh) Thomas was, like their father, elected a Burgess of Edinburgh as a member of the Corporation of Wrights in 1737, and was repairing astronomical instruments for the University of St. Andrews eleven years later (Bryden, *James Short and his Telescopes* 32). While Professor Maclaurin praised telescopes by James Short as "by far the best of their lengths that have yet been executed," he wrote to Sir Andrew Mitchell in 1743 warning "A' propos I must caution you against Shorts [sic]. His brother has proved the completest Villain has ever fall'n in my way. It would amaze you to tell you how he has used me but *non est tanti* [it is not worth it]".[24] Though lacking his brother's skill or reputation, Thomas would nevertheless make his mark late in life, after all of his siblings had passed away. His move to London, prompted by the sudden death of James in 1768, set in motion decades of struggle and ambition for himself and for his descendants.

James willed most of his estate to the second brother Alexander (who predeceased him by a few months) and subsequently, to their sixteen-year-old charge—their nephew James junior of Virginia.[25] When Thomas leaned that James left him only £100 out of a fortune valued at nearly £20,000, he would argue that as Alexander's heir he was entitled to both James's and Alexander's estates. Despite his challenge being unsuccessful, Thomas took charge of James's workshop, completed its outstanding orders and acquired 64 mirrors that James had polished for his reflecting telescopes.[26] Among them was the Great Telescope, an instrument that would boast a greater magnification power than any other in the world. It had a 13-foot tube with a 12 1/4-inch speculum, and 12-foot focal distance (figure 7d). Since its original buyer, the king of Denmark, could no longer honour the commission, Thomas returned to Edinburgh with the reflector and the rest of the telescope in parts, planning to reassemble and display the instrument for profit—a project that his daughter would in the following century pursue with the same instrument.[27]

Thomas initially installed the Great Telescope on the roof of Heriot's Hospital, but soon after applied to city magistrates for a lease on Calton Hill where he could construct a relatively modest building for the device and charge an entry fee for its use. Yet upon learning of his scheme, the anatomy professor Alexander Monro (secundus), warned other local men of influence that being intended as a private, for-profit venture, Thomas's project would run contrary to the interests of astronomical science, the university and the city (Arnot 319). Therefore, recognizing the need for an observatory in Edinburgh that was accessible for research and instruction, Town Council gave Thomas a ninety-nine-year lease in May 1776 for a one-penny payment given the provision that they could set the admission price for the city's university students.[28] However, with Thomas seeking subscriptions to build a more ambitious building, the observatory project soon expanded. Following Monro's suggestion, the university offered what remained of its observatory fund (£400), which Maclaurin and the Earl of Morton had initiated three decades earlier.[29] With a proposal for a more elaborate edifice designed by James Craig (planner of Edinburgh's New Town) a new agreement was struck on July 10, 1776, and on August 25, 1776, Lord Provost James Stoddart placed the foundation stone. The revised contract stipulated that the city would own the instrument and buildings, and while Thomas could collect user fees, he could only pass the agreement on to his sons and grandsons—female relatives, including wives and daughters, could suffer eviction upon his passing.[30] At the time, the aging and widowed optician had three grandchildren (James, Thomas and Margaret Douglas) by his daughter John and "mariner" Reynald Douglas, and no other family.[31] However, one year after the agreement was drawn, he married young Jacobina Downie, likely believing that income from the new observatory and whatever funds he could access would be sufficient to care for a new family.

Building plans changed again and costs ballooned after visiting architect Robert Adam suggested that the observatory be made to resemble a small fortress. As a result,

> The beauty of the design was so much admired that the main object was forgot. The workmen left the observatory, already half built, and turned themselves to raise the tower on the south west brow of the hill… Upon this building, was exhausted all the money destined for the observatory; besides a considerable arrear was incurred to the tradesmen (Arnot 320, also qtd in Bryden 462).

The Lord Provost meant to oversee the new scheme, Alexander Kincaid (1710-1777), died soon after in office, and Town Council under his successors stopped paying the bills. As the only completed section of the plan, the Gothic Tower became home to the telescope as well as Thomas, Downie and their growing family, while legal battles over outstanding building fees waged on. In 1784, plumber William Scott took the telescope's reflector as security and even though it was city property and city debt, the Shorts took Scott to court at their own expense to retrieve their only, albeit limited, source of revenue.[32] The unfinished observatory, with the Great Telescope situated in the Shorts' house, however held little attraction for scientific researchers or general audiences. Never earning more than £8 annually, the employment of an assistant at a £10 yearly salary caused upkeep to exceed income (Beverly, Appendix A).[33] With no observatory completed and no fortune ever made, after the death of Thomas in 1788, his contract with the city obliged his widow and daughters to lose their home and any hope of a livelihood, in favour of Thomas's adult grandson from his first marriage, James Douglas.

With its maker exemplifying the Scottish ingenuity, craftsmanship and success through a technology of far-ranging vision, the Great Telescope possessed a value that by the late 1820s was arguably more symbolic than scientific. Its existence was practically forgotten by the time Maria petitioned for its possession. Nevertheless, to place it in the hands of a woman and a stranger was no easy decision, even if she did descend from some of the city's brightest stars. Identifying herself as Thomas's daughter and last surviving child, Maria argued that the failure of subsequent administrations to fulfill their predecessors' promises invalidated the discriminatory agreement that allowed only male heirs to continue the observatory project. An unrelenting and therefore willful subject, she wrote no fewer than four times to city magistrates in as many months (Appendix B). The earliest letter kept in Edinburgh City Archives is dated December 11, 1827 and the final is dated March 28, 1828. Having thoroughly examined contracts, invoices and other documents relating to her father's project, in her second letter, dated January 9, 1828, Maria concludes that not only was Thomas forced to deal with lawsuits filed by tradesmen that Town Council had failed to recompense, but that the whole of the building costs including those unpaid amounted to less than a third of the Great Telescope's original value. As Maria explained, the mismanagement of the observatory project by the City

was considerable. Moreover, in her subsequent letter, dated 22 March 1828, Maria also blamed the former Town Councils for the poor condition of the instrument. She wrote,

> I have also to add that the telescope never received any injury from any part of our family having seen it myself erected in the Observatory in a perfect state of preservation long after the death of Mr. Douglas/Mr. Short's grandson - so that any injury it has since sustained must have proceeded from the damages occasioned by the ruinous state of the Observatory and the carelessness of the person to whom the Magistrate gave it in charge.

And summarizing her argument for the Telescope's return in the same missive, she further identified the negligence of past officials.

> I feel it is unnecessary to state to you my Lord that a bargain is equally obligatory on both contracting parties, my Father's part in the Second Contract after having given up the Instrument was to exclude his Daughters, this he did by the bargain. The plain and obvious duty the Magistrate had to perform was to erect in a reasonable time a building sufficient for the proper application of the instrument. *This they did not do.* And it is on this circumstance and the losses to which it subjected my family I ground my Claim (orig. emphasis).

Impostor Syndrome

The case of Maria Short would have been cause for concern among members of the Astronomical Institution of Edinburgh since the society, the first of its kind in the UK, had benefitted indirectly from her family's misfortunes. Soon after the Institution's founding in 1811, Town Council granted the private association use of the observatory grounds including the Shorts' old house, which I refer to throughout this text as the Gothic Tower (Hermann Brück 7). Having demolished the old octagonal observatory that Thomas Short's grandson James Douglas saw completed in 1792, they replaced it with a new building in 1818 that soon after became the Royal Observatory of Edinburgh.[34] However by the late 1820s, it still lacked a full-time astronomer or equipment suitable for scientific study.[35] Describing Maria's loss as "alleged," the mathematics professor William Wallace who acted as a part time observer wrote to Town Council on behalf of the Astronomical Institution and the University of Edinburgh. He recommended they obtain proof of her identity and suggested that the old instrument be kept by the city or else granted to one of the organizations that he represented. In a letter, dated May 16, 1828, Wallace assured city magistrates, "I remember Thomas Short very well and I never heard of his having any Legitimate daughter" (ECA D0105R).

In response to Wallace's insinuation, Maria found three local citizens to sign attestations of her identity, and through Thomas Fleming, who acted on her behalf, submitted the documents to Adam Luke, City Treasurer and head of the committee appointed to oversee the matter. Fleming was a local shawl manufacturer who penned a number of letters in support of Miss Short, although the exact nature of their relationship is uncertain. Fleming wrote that Thomas Short had nine children (three sons and six daughters) by his second wife, with Maria being the youngest. With the circumstances of her birth being cause for a fifth lawsuit involving her family over the City's failure in the observatory project, he added:

> [S]he is most anxious to avoid making enemies but as one starts up unlooked for and unprovoked she has only to say that as she herself is the only being now in existence that has suffered by the dispute about the observatory, the property which ought now to be her support being exhausted thereby, she thinks no other person has any right to complain (2 June 1828, ECA D0105R).

Fleming's letter to Luke accompanied three testimonies signed on May 28, 1828 by acquaintances from Maria Short's childhood (ECA D0105R). In his statement written at "College Library," Nicholson Bain asserted that Maria and "one of her sisters" had boarded with his father's family at Hopes Park End, from the time of their mother's death until the "youngest [Maria] went abroad." Bain explained that Mr. Moir, an accountant on Princes Street, alongside Mr. Keith of Ravelston and Lord Glenlee acted as trustees for the late John Short of Virginia (their cousin) and paid the sisters board, and he added that the girls' father had died in "embarrassing circumstances." A Mr. Kidd (his first name is illegible) signed a declaration at Canongate that concurred. It stated that Kidd had been neighbours with the Short family when he lived on St. Ann Street, and that he recalled the death of Thomas Short, the birth of Maria, and that three surviving daughters had been cared for by friends, naming the same individuals mentioned by Bain as their source of financial support. A teacher named Charles Campbell supplied Maria's final reference. Sharing the same paper as Kidd's and likewise signing at Canongate, Campbell wrote that he taught writing and arithmetic to Maria and her sister Margaret, and that Maria corresponded with him after she went away with "a Friend" whose son had boarded with him. The statements satisfied Luke's committee and during their meeting of June 18, 1828, Town Council approved their recommendation that, "the best mode of

disposing of the instrument […] after having consulted with professional gentlemen as to the practicability and expense of repairing it, that the same should be given to Miss Short in its present state" (18 June 1828, ECA TC Minutes [203] 284).

While questioning the identity of Maria Short during her lifetime was one method to discredit her, retrospective accusations of fraud more than century and a half later add to her mystique. Being a woman who literally and repeatedly fought city hall in the first half of the nineteenth century makes her a remarkably willful subject, but to do so as an impostor would have been an even more impressive feat. Suspicions that Maria was not who she claimed resurfaced after her re-emergence in the footnotes of other histories. Like traces of the Short's Observatory sign that remain on the outer wall of the Edinburgh's Camera Obscura, evidence of its founder, her endeavours and exclusions endure in local archives. In the last decades of the twentieth century, as researchers began investigating the history of Scottish astronomy, they would find in the Edinburgh City Archives, bundled with papers describing Thomas's attempt to build the city's first observatory, correspondence relating to Maria's campaign for the Great Telescope. Consequently, Maria appears at the margins of studies, which note the roles of her father and uncle—Thomas and James—in histories of astronomical observation, such as David Gavine's unpublished 1981 thesis "Astronomy in Scotland 1745-1900", and D.J. Bryden's 1990 article, "The Edinburgh Observatory 1736-1811: A History of Failure".

In 1992, Veronica Wallace published an eight-page article on Maria Short in *Edinburgh Review,* called "Maria Obscura." Yet despite an indication at the end of Wallace's article that she was "doing more research on Maria Short and would welcome any hints or advice" (109) no follow-ups exist.[36] Subsequent accounts, including the entry on Maria in *The Biographical Dictionary of Scottish Women: from earliest times to 2004* (2007), chapter two of *Mary Bruck's Women in Early British and Irish Astronomy: Stars and Satellites* (2009), and staff at *Edinburgh's Camera Obscura and World of Illusions*, cite the text by Veronica Wallace as their main reference. Yet beyond its recognition of Maria as the founder of the Edinburgh camera obscura, Wallace's article raised the tantalizing question of her true identity once again. It challenged the veracity of the signed attestations as outright lies or the manipulations of failing memories. Wallace

argued that with witness testimonies being vague about dates and places, and the 1861 census listing her age as fifteen years too young for a child of someone deceased in 1788, it was possible that the woman who called herself Maria Theresa Short was not who she claimed.

Maria's Vital Records

The Scottish Records Office has only a few vital records for Maria Short and all originate in the middle decades of the nineteenth century, long after William Wallace first questioned her identity in 1828. Located through nominal searches of the *ScotlandsPeople* genealogical database and manually linked, in spite of minor discrepancies, through notations that include names of relatives, places, and dates, the now digitally-scanned entries include Maria's register of marriage to Robert Henderson on April 26, 1843, the couple's entries in the 1851 and 1861 censuses, and the records of their deaths in 1869. The records can be found under her married name, but also include her birth name according to Scottish convention. The marriage registry identifies Robert as a merchant living on King Street in London, whereas it lists Maria as living in Edinburgh at 13 Earl Grey Street and names her father as "Thomas Short, Surrey Street, London." The other documents on file (such as Henderson's record of birth and Thomas Short's record of death) suggest that Short and Henderson were in their forties when they wed and that their marriage produced no children. At the time of the 1851 census, "Mary" (no occupation listed) and "fund holder" Robert Henderson, both aged 53, lived in a tenement at 11 High Terrace.[37] With the census occurring between the 1850 closing of Short's Observatory on Calton Hill and its 1855 reopening on Castlehill, the duration of their residency at High Terrace is uncertain; they may have occupied the Calton Hill venue before its demolition as postal directories suggest, and moved to the Castlehill location following its 1853 purchase and renovation. By the time of the 1861 census Short and Henderson were living at Short's Observatory (549 Castle Hill) and with only one window in their residence, they likely let rooms to the numerous other people listed at the same address. "Maria T. Henderson, Conductress" aged 58, appears below "Robert Henderson, "Keeper of the Observatory" aged 59. Their records of death also indicate their ages. "Maria Theresa Henderson, married to Robert Henderson, proprietor of Short's Observatory" passed away of "debility" on January 15, 1869

inside Short's Observatory on Castlehill with only Robert in attendance. Maria's age was listed as about 70 at the time of her death, while Robert "widower of Ann [sic] Short" passed away soon after on May 18, aged 71. The two censuses and records of death put Maria's year of birth at 1798, 1799 or 1803, and Robert's at 1798 or 1802. A record of birth for Robert indicates that he was born May 23, 1797 to Robert Henderson and Margaret Taylor (names also listed on his record of death), but no record of birth or baptism for Maria exists. Town Council minutes refer to a report identifying her as the "posthumous and now only surviving child of Mr. Short" (16 April 1828, ECA TC Minutes [203] 147-148). According to his records, Thomas Short died on March 13, 1788 and so could not father a child born after January 1789. Maria was either 10 to 15 years older than her reported ages or not the daughter of Thomas Short.

Does the absence of early records for Maria Short or the contradictions found in later ones constitute evidence of fraud or its potential? No statutory or centralized registry existed in Scotland before 1855, so the accuracy of any documents concerning identity that predate that time cannot be assumed. Moreover, the discrepancies of age indicated by Short's and Henderson's responses to the 1851 and 1861 censuses follow a recognizable pattern. With household heads (generally being husbands and fathers) responding to census questionnaires, "statements of age [were] most prone to error" and less reliable for women than men, and even more so for those who were "elderly." (Tranter 12). Robert Henderson might have not known, or deliberately lied, about his wife being much older than stated. Decades before the censuses, Maria had already referred to herself as being in "advanced life." In 1830, when she would have been twenty-seven to thirty-two according to the censuses and her death certificate, she requested a royal pension from the British monarch, writing:

> That your Majesty's Petitioner now the only surviving relative of these eminent men, feels herself thus compelled in *advanced life* & delicate health, to throw herself most humbly on the well known humanity, kindness & generosity of your Majesty (NSA GD224/588/7/15, emphasis added).

Old registers with their errors and inconsistencies may provide insufficient reason to accuse the woman that called herself Maria Theresa Short of fraud, but that does not mean that suspicions about her identity are entirely unfounded. While genealogical records and other archives verify

her existence between 1827 and 1869, before my investigation, there existed no proof that Thomas Short had a daughter named Maria. Likewise, a discussion reported in the previously noted Town Council minutes of April 16, 1828 is the only historical source to cite Maria's whereabouts before 1827—the journey to the West Indies in her youth and settlement afterwards in Ireland with a sister. That may have been based on little more than an interview with Maria, and so that too could be fabrication. With permanent and temporary migration from Scotland to the British Caribbean common from the eighteenth century onwards, lacking comprehensive records of such activity, as well as details such as dates, ports of departure, or places of settlement, the veracity of her claim is difficult, if not impossible, to verify or challenge.[38] Confirmation and disproval of Maria's story are thus also thwarted by the unevenness of recordkeeping in Ireland and the Caribbean.

Nevertheless, by examining parish records of births, marriages, and burials (which reliant on the assiduousness of individual clerks are by their nature irregular and incomplete), I investigated the late eighteenth-century marriage of her parents. I looked for evidence of the nine children—six girls and three boys— that Thomas Fleming had alleged it produced or anything that might substantiate the testimonies of Bain, Kidd and Campbell. The *ScotlandsPeople* database is a searchable consolidation of historical vital records maintained by the National Records of Scotland, but it contains no birth records for children of Thomas Short and Jacobina Downie named Maria or Margaret (the sister named in Campbell's testimony). However, it does record a series of infants born and lost in the union that officially began in 1777 and ended with Thomas's death eleven years later on March 13, 1788—reportedly at age 75.[39] Records indicate that they registered three daughters and two sons before 1787, with only two daughters John and Jacobina not recorded as deceased.[40] John and Jacobina may have later had undocumented name changes that made their lives and deaths even more difficult too trace. If Fleming's count of six daughters and three sons was correct, three other daughters and another son were never registered. Therefore, this further exploration of Scottish vital records for the Short family resulted in an incomplete family tree and uncovered no evidence that could verify or disprove the existence of Maria Short.

Vital records do however present a rough outline of the Short-Downie union that supposedly produced Maria Short, and the challenges that her mother faced in her married life would have affected her children directly and her daughters by example. Documentation shows that in the four-year period that concluded her marriage, Jacobina Downie lost at least three children and her husband. Reportedly, aged thirty-seven when she passed away on March 3, 1796, Jacobina Downie would have been only eighteen or nineteen on the day of her wedding in May 1777—by contemporaneous norms, a rather young bride—and just a few years older than the grandchildren of her sixty-five year old groom.[41] Given the prescriptive ideology of companionate unions then gaining increasing circulation and the unlikelihood of a marriage taking place without mutual consent, the possibility of romance between teenager and old man exists, but not without the considerations of material interests, socio-economic compatibility and patriarchal expectations of wifely submission at play.[42]

Let's forget familial and societal pressures, and the potentially irresistible charms of Thomas Short to imagine what Jacobina Downie had to gain from this wedding, and how expectations and outcomes impacted her children. Later documents suggest that a marriage contract once existed that provided for Downie after Short's death. Is it possible that the bride hoped for a brief marriage to a man of good society who would be increasingly too frail to make unreasonable demands, followed by an escape into comfortable widowhood? Realizing the need for a son to secure her position by the terms of Short's 1777 contract with the City and recognizing a high rate of infant mortality, perhaps she anticipated a sequence of pregnancies and children lost as the necessary, if unfortunate, price for financial security after her husband's eventual passing. Mid-eighteenth-century Scotland saw a fifth to a quarter of all infants, who were born alive, die before their first birthday, a number that fell to one sixth by the 1790s (Houston, 14). Yet in addition to the travails of childbearing and child burying, Downie would find economic hardship in place of affluence, and lawsuits in place of influence. For how could she or her husband foresee the negligence of the city magistrates ruining the earning potential of an optical treasure, and leaving their family to deal with litigation by unpaid workers? Who could imagine that the university professors and the astronomy aficionados would be unable or

unwilling to continue their support of Thomas Short's venture? Yet such conditions having come to pass underlined the case for Maria Short against the City of Edinburgh.

Along with their agreement with Town Council, the would-be observatory keepers still hoped to receive a greater portion of James Short's fortune, and that also contributed to the family's downfall. Moreover, following this other trail lead me to records that prove as well as outline the early life of Maria Short. Although Thomas had inherited very little from his brother James, and had already lost his challenge to the rich man's will, much of the substantial estate remained in play long after his death. The heir, James Short junior of Virginia, died soon after signing his own will in Lisbon in 1774, and Thomas, reporting that his heirs in Virginia were already dead, insisted that he inherit any of his brother's estate that remained (NAS RD3/246).[43] James senior had willed the succession to Mary Douglas (then Countess of Aboyne) after his relatives in Virginia, but at the prompting of her father, the Earl of Morton, she relinquished that right to Thomas Short and his family (Erskine 255-256). However, Thomas's proof that his Virginia relatives had all died "turned out very lame" so the guardians who had earlier been appointed to James junior opposed Thomas's claim and searched for the siblings of their deceased charge (NAS RD3/246).[44] Finding the next brother of James junior, John Short junior in Virginia in 1784, finally enabled the settling of the wills. As the next in succession to the two James Shorts (senior and junior), the Virginian claimed the balance of the optician's fortune. In death, the younger James had been generous towards Thomas, but with money likely long spent. The final will and testament of James junior opens with the cancellation of a bond from Thomas for an outstanding loan of £411 (Ibid). Without that specification, John Short junior, as his brother's heir, could have pursued the debt. Instead he set up a trust fund in 1787 to provide an annuity for his uncle and Edinburgh family. That gift would become the object of lengthy litigations—not unlike the Great Telescope itself.

If Thomas's death in March 1788—having (according to his official record of death) "died suddenly dropping down in the street," less than a year following the establishment of that trust fund—seems slightly suspicious, then the tragic death of his little boy days later would undo any potential convenience brought to his young widow by the loss of the old man. With

no other sons surviving, the terms of the 1776 agreement would see Downie and her remaining children evicted from their home and the loss of any income that the Great Telescope could provide, in favour of Thomas's grandson by his first marriage, James Douglas. The significance of the contract and its outcome cannot be overstated. The now homeless young widow, who was not yet thirty, responded in an extraordinary manner. Refusing to surrender what she considered to be rightfully hers, and with actions that became increasingly desperate, Downie would ultimately find both infamy and ruin. A testimony kept in the City Archives by Elisabeth Beverly (the wife of James Douglas) would explain in her own missive to Town Council that Short's widow (perhaps inspired by the plumber William Scott), "carried off the Speculum and most of the other moveable apparatus belonging to the Great Equatorial Telescope" and hid the parts in different places in the city, necessitating Beverly and Douglas to overrun their own expenses by paying warrants for their retrieval (See Beverly's letter, Appendix A). Yet, Downie's actions on the night of November 7, 1788 were far more extreme. She would lead a party of about dozen assailants that "under Cloud of night, and armed with Blunderbusses, Pistols, Swords, Cutlasses and other lethal weapons" stormed Calton Hill in an attempt to forcibly repossess the Gothic Tower and the instruments inside.[45] First encountering Douglas's friend, an accountant named Robert McLean and a locksmith, who was there to fix the garden gate that Downie had broken during her earlier departure, the raiders attacked McLean "by cutting and maiming him on the head, and other parts of his body, to the great effusion of his blood and other parts of his body, and danger of his life," and once inside the house, ended up "assaulting and abusing" hostages Elisabeth McLean and Elisabeth Beverly. The night concluded with arrests by the City Guards, but only four—Downie, John McFadzen (an apothecary and university student), David Drysdale (son of a merchant from Leith), and John Smith (a builder)—faced criminal charges. Charges against other members of the party, who took lesser roles, were dismissed because they were likely misled by a false warrant.

Criminal proceedings took place on January 26, 1789 before the Lord Provost and a fourteen-man jury of mostly merchants, and a record of the trial remains on file in the Edinburgh City Archives (ECA SL233/1/4 1-54). Although it includes the testimonies of numerous witnesses, the defendants' statements are missing. However, it is possible to still determine the following

sequence of events. Downie voluntarily quit the Gothic Tower in the week before the attack, carrying with her most of the furniture and leaving behind only her servant, Margaret Robertson, and one of the Short children (Joanna or Margaret) to do laundry—an impropriety on "Thanksgiving" (Guy Fawkes Day) that James Douglas and Robert McLean would disallow.

Could a maid's desire to wash dirty linen on a holiday—that year mandated by the Church of Scotland to also commemorate the centenary of the Glorious Revolution of 1688—have been enough to provoke the attack? Or did Downie believe something more had occurred? In his testimony, Douglas was compelled to deny seeing any of the Short children (35), and Robertson, in hers, admitted to lying to Downie about leaving the Gothic Tower a day early "being afraid of mischief" and not informing her of its occupation by Douglas and McLean (43). James Douglas testified that during the night of the attack, Downie "shoved" his wife, "called both Mrs. Douglas and Mrs. McLean several opprobious names," accused Elisabeth McLean of theft and insisted on an immediate search of the house (38-39). He also explained that Downie attempted to make amends, regretting that she and Douglas "had been so long at law together, on a subject that she had no right to," but refusing to yield, her co-defendent McFadzen announced that "he would be cut in pieces rather than he would leave the House that night" (40).

The court found Downie and her cousin John Smith innocent of all charges, and sentenced McFadzen and Drysdale, whom Douglas saw strike McLean, three months in the Tolbooth jail with their releases contingent on payments of fines set at 500 Scots merks (equivalent to approximately £300 Stirling) and a bond pledging that another 500 merks be paid, should they fail to keep the peace for three years. While the trial records note that Drysdale died in prison soon after, it seems that John McFadzen paid his fine and served his sentence. Coverage of the events extended beyond local press. *Scots Magazine* and no fewer than four London newspapers, and a tourist guide for Edinburgh reported on the attack and trial.[46] *The Star* in London published a particularly sensationalist account, which I quote here in full.

> The polite art of boxing is not confined to the gentlemen only–Mrs. Short, widow of the late famous optician of that name, a Lady more celebrated for her gallantry and frequent amours than for her virtuous qualifications, lately marched up to the Observatory, on the Calton Hill, at

> the head of a numerous band of beaux, rank and file, to take possession of the house or observatory, which had been left to a Mr. Douglas, nephew [sic] to her husband. Mr. McLean, of the Excise-Office, a celebrated mathematician, and some more of his friends, were there at supper. Mrs. Short demanded possession with a false warrant, her Cicisbeo, McFadzen, an apothecary, and her other attendants, being ready to fire, if they refused. A dreadful scuffle ensued, in which this amazon fought with great bravery, and had it not been for the timely aid of a party of soldiers, who surrounded the assailants, and took them prisoners, some lives might have been lost.
>
> This Lady is the famed Mrs. Short who went down in a diving bell, with Spalding, some years ago; she also wished to accompany Lunardi, but the balloon would not sustain her weight, she being with child at the time to — Caldwall, the miniature painter (6 December 1788).

It is tantalizing to imagine Jacobina Downie, identified in legal documents under the insipid moniker "Relict of Thomas Short," as an adventuresome beguiler with a "band of beaux." But just how much of *The Star* report is invention? John Caldwall, the miniature painter is named as witness alongside mathematics professor Dugald Stewart for the 1782 birth of Downie's daughter John, which suggests that she and Thomas Short once kept company with diverse members of Edinburgh society.[47] Yet there is no evidence of an affair with the artist, or any association with diving bell inventor Charles Spalding, or balloonist Vicenzo Lunardi though all appeared in Edinburgh in the 1780s.[48] The equation of John McFadzen and *cicisbeo* (defined as the lover or escort of a married woman) bears documentary support. While there is no telling whether the two became paramours before the death of Thomas Short, they were certainly together by the time of the attack. The legal paper trail left by their romance would reveal that McFadzen played an essential role in Downie's slide into poverty and lead me to the sad case of three orphaned sisters, the youngest being a little girl called Maria Short.

Before my study began, existing research failed to verify that Thomas Short and Jacobina Downie even had a daughter named Maria Short. However, I discovered that such a girl had indeed existed, and I followed her and her family through the archives in an effort to make a positive identification. While registers had offered scant information about Maria's existence, court records yielded considerably more. Papers that amassed from the civil suits that followed the conviction of McFadzen and Drysdale, remain within Court of Sessions files kept at the General Register House of the National Archives of Scotland, and many reference a child called

Maria Short and two older sisters named John, Johan, Joanne or Joanna and Margaret. Produced in the final decade of the eighteenth century, the documents pertaining to Jacobina Downie and her three daughters concern the collection of debts and challenges to the bequests that might have covered them. Those presumably closest to the family count among the creditors of the young widow and her daughters, and with records of only those who pursued them through the courts, the possibility that other lenders chased them by other means is not unlikely.

The archives chronicle the "embarrassed circumstances," a euphemism for the impoverished state of the Short family finances left by Thomas Short, and the desperation it generated with the further accumulation of debt. As one way to mitigate her expenses, Downie attempted to place seven-year old John (called Joanna in later documents) in a charity boarding school for girls called the Trades Maiden Hospital in April 1789. In her request to its administrators, the United Incorporations of Mary's Chapel (the Wrights and Masons of Edinburgh), she explained

> [Y]our Petitions[sic] deceased Husband was at the time of his death a member of your United Incorporations for above Forty five years, and has left the Petitioner in narrow circumstances with three young children altogether unprovided for;[49]

I have been unable to verify whether Joanna attended the school, but it seems that the situation worsened all the same.[50] In August 1789, her mother could not, or would not, pay her solicitor Robert Renton, for the work and expenses he had laid out trying to keep her first in her home on Calton Hill, and then from jail. Filing an action to suspend his invoice by claiming McFadzen had managed their legal affairs, Downie stated

> And in regard that my liferent provisions [an annuity or pension] are arrested at the Chargers instance and I have no other funds whatever and at present not even the means of subsistence, and late Events have rendered it impossible for me to get any sufficient person to bind for me as a Cautioner, the present charge ought to be suspended ("Bill of Suspension for Jacobina Downie 1789," NAS CS271/29758).

In turn, Renton penned a response that begins by calling her request "as ungenerous and ungrateful as any perhaps ever occurred in this Court," explaining that he had spent "nearly £30 to vindicate this Lady's right and to save her person from the Pillory, whipping or banishment" ("Jacobina Downie v Robert Renton" NAS CS271/30364). Renton's statement furthermore

outlines the events that followed the death of Thomas Short, offering little pity for the plight of his widow. He explains that it was Downie's conviction that the Great Telescope was the only thing of value that might pay the "pretty considerable provisions" of her marriage contract to Thomas Short, in spite of its being owned by the City, attached to the Calton Hill tenancy, and the revenue from its application belonging to whomever was declared Thomas's heir. James Douglas, had advanced his claim on the unfinished observatory and the Great Telescope soon after his grandfather Thomas had died, and concerned by the "danger of Mrs. Short [Downie] either destroying of disposing of it," he requested that the instrument be locked up until the right of inheritance could be settled (Ibid). Of particular note is Renton's explanation that Downie had conceived another child before Thomas's death, which obliged a delay of the transfer of property since a new son would outweigh the rights of Douglas and enable Downie and her children to stay. Unfortunately, another daughter emerged from the widow's final labour, and although Renton does not identify that infant beyond the consequences of its sex, it was most probably the girl named Maria Short.

Though no references to "Maria Theresa Short" predate 1827, "Maria Short" is named in various lawsuits brought against her, her two older sisters, and their mother to determine beneficiary rights, settle old debts, and following the death of Downie in 1796, to establish legal representation and care for her children. Having taken the Great Telescope, the house, and the lease on Calton Hill, James Douglas would demand of them what little remained. That included Thomas's assets at the time of his decease and the trust fund set up by John Short junior of Virginia to care for his family. Thomas had borrowed nearly as much from his grandson as he had from his nephew over a decade before, and Douglas would attempt to collect as much of the £408 debt owed to him as possible. When the estate of Thomas Short was finally settled in 1893, with an independent appraiser valuing his optical supplies and other belongings at just over £116, a Decreet before the Sheriff Depute of Edinburgh granted his creditor/heir the "good and undoubted right" to everything.[51] The ruling excluded the £900 that remained in the trust fund set up by the Virginian, which provided for Downie and her children. However, Douglas with his sister Margaret would make at least two bids for that resource as well.

Interest made off the trust fund provided income for its recipients that, in her suit against Renton, Downie complained had been suspended by his doing. Renton denied his part in the matter, explaining that she had forfeited the annuity by her marriage to her co-defendant in the criminal trial, John McFadzen, "who had always paid a particular attention to her and her concerns." Though the lawyer likely knew of his clients' relationship, whether he broke their confidence before his suit against Downie is uncertain. Nevertheless, it would be Thomas Short's two grandchildren who played the decisive role in the disruption of that income. Having been informed of the union by Margaret and James Douglas, the trustees who managed the John Short fund (Mr. Keith and Mr. Moir), requested a legal inquiry (a *multipoinding* according to Scots law) to determine the rightful beneficiaries.[52] Arguing that Downie had remarried and thereby relinquished her rights, the Douglases claimed that the trust should be divided between Thomas's five surviving descendants, with two-fifths to them and the rest to his three children (John, Margaret and Maria Short). And while there is little to countenance their characterization of Downie's wealth, the Douglases claimed

> By contract of marriage with the late Thomas Short, she has £40 a-year secured to her, and regularly paid: she has also £12:10 yearly, from the incorporation of St. Mary's Chapel; and she further, in name of her three children draws three-fifths parts of the interest of the funds in the hands of the raisers of the multiple-poinding. Moreover, with the assistance which, it is informed, she receives from the emoluments of Mr. McFadzen's business, she lives comparatively in a state of splendor and affluence, while her opponents are anxiously looking for their two-fifths of £900 to keep them from poverty and want.[53]

Aside from the £900 trust set up by John Short junior, there is no evidence that any of the other income cited existed. Downie's original marriage contract with Thomas Short may have promised a generous pension, but Renton's statement makes clear that no source for that provision existed. Downie's name does not appear listed among receipts for the Widow's Pension kept in the St. Mary's Chapel accession at the Library of Scotland (NLS Acc 8351 bundle 19) and there is no evidence that McFadzen earned much income. Downie countered the Douglas's charge that she had remarried by arguing that her union with McFadzen had never been formally registered. In an explanation that foregrounded desire and the policing of extra-marital sex as reasons for having faked a marriage to McFadzen, she explained,

> It becomes often necessary for two persons, who wish to indulge themselves in the gratification of an amorous intrigue, to pass themselves for man and wife; but this of itself is by no means sufficient to constitute a marriage.[54]

In the absence of the "undocumented proof of marriage," the central question of the case became "what species of proof ought to be allowed in such a case where a third party avers the marriage and the supposed married persons positively deny it?"[55] In other words, what constituted matrimony when only dalliance was admitted? The loss of benefits would certainly be one reason for a widow to avoid remarriage. Already a defendant in a criminal case, with outstanding legal fees and a lover that had been fined and imprisoned for riot and assault, it is of little wonder that Downie would sooner risk reputation than income. Having identified McFadzen as a "surgeon" that attended to their grandfather and his family for several years, James and Margaret Douglas submitted the following claims as proof of his marriage to Downie, all of which she denied: 1) the couple had celebrated their union in March 1788; 2) they called each other husband and wife in correspondence as well as in speech; 3) their relationship continued through McFadzen's incarceration, with Downie visiting him in jail; and 4) the couple continued to live together, with the children being told to call McFadzen "pappa".[56]

With the accusation that Downie and McFadzen wed the same month that her husband died, is it possible to cast further doubt on Maria's parentage by suggesting that that they had turned Thomas Short into a cuckold? The Douglas testimony however is never so indelicate. Nevertheless, I also wonder if being cared for by an apothecary who is smitten with your wife isn't a little dangerous. Thomas Short, did you drop dead of a heart attack or stroke, or was something more sinister afoot? Afterall, if not for the untimely death of the littlest James Short, his mother/your widow and her lover stood to keep all that was yours in that boy's name. Regardless of salacious speculations more fit for detective fiction, the proofs of marriage submitted by the Douglas siblings convinced the courts to legally recognize the wedding of widow to druggist. The victory accomplished after a "long litigation" and confirmed in the documents of a subsequent suit, caused Downie to lose her part of the trust and see the marriage that she denied upheld by law (NAS CS231/D6/2/10).[57]

The ruling that would confine her sexual activity to marriage and juridically keep the relict's virtue, if not her income, intact, upheld the tradition of irregular marriages that usually required little more than an exchange of mutual consent. Scottish authorities recognized such unions well into the twentieth century, long after England's Hadwicke's Act of 1753 mandated that all marriages be regular, i.e. performed and registered under the aegis of an established Church.[58] While frowned upon by the Church of Scotland, three types of irregular marriages existed: 1) *per verba de praesenti* (by present interchange of consent); 2) *per verba de futuro subsequente copula* (by a promise of marriage followed by consummation); and 3) cohabitation by habit and repute. Making their private affairs a matter for public scrutiny, the Douglases argued that the union of Downie and McFadzen conformed to the third condition, if not also the first. Still, with neither the existence of a contract for her first marriage nor the absence of a contract for her second doing her much good, the 1796 burial record of Jacobina Downie, which identifies her as "wife of John McFadzen," suggests that she stayed with McFadzen from the month that Thomas Short died until her own death eight years later. In the end, Downie may have accepted the forced change in civil status that made her dependence on McFadzen complete. It would be nice to imagine that the woman who spent much of her relatively brief adult life in labour and litigation had enjoyed some of the "splendour and affluence" that her rivals depicted, and if not, that the marriage decreed lawful against her will and at the cost of an independent income, had at least been a partnership borne through love and kindness.

Though James Douglas prevailed in each of his battles against Downie, his right to the Great Telescope and Calton Hill tenure and his efforts to make them profitable would prove more bane than boon. His struggles, which were not so different than the failures that preceded him, demonstrate the ongoing challenges to observatory-building in Edinburgh that continued well into the following century. Identified as a lieutenant when he was listed as a witness for the 1783 registration of birth for Downie's second child and as a writer (the Scots law term for solicitor) on the 1787 registration of his marriage to Elisabeth Beverly, Douglas and his friend Robert McLean (whom McFadzen and Drysdale had wounded in the 1789 attack) successfully petitioned Town Council for funds to finish the Observatory in 1791.[59] However, the costs of construction for the octagonal structure completed to house the Great Telescope (figure 6

detail), exceeded their original estimate and city magistrates refused pay the difference.[60] Obliged to absorb the additional expense, and unable to attract serious use or additional investment from the university that might properly equip the site, Douglas returned to the navy soon after, leaving his wife to care for their three infants and to act in his stead. At the end of 1793, Elisabeth Beverly penned a detailed missive to Town Council, outlining the city's negligence to both Douglas and his grandfather, and how her family had personally paid for the maintenance of city property out of prize money awarded for her husband's activities in the American Revolutionary war (Appendix A). Requesting compensation for expenses already met, Beverly demanded that Town Council meet the terms set forth by the 1776 agreement so the observatory could at last generate some revenue. Town Council responded by fixing the yearly admission fee for university students at £1, considerably lower than the £5 she suggested, and then did nothing more. Beverly died little more than a year later in February 1795 at the age of 28, and shortly after, Douglas remarried and presumably returned to sea.[61] There is no indication that in the intervening decades before the return of Maria Short, that the Douglases or other relatives of the Shorts lived in the Gothic Tower or made further attempts to earn a living from the Great Telescope. However, the detailed letter of Elisabeth Beverly became a foundation for Maria Short's claim three decades later.

Jacobina Downie died just over one year after Elisabeth Beverly on March 3, 1796, leaving behind three daughters, aged 7 to 14, with outstanding debts and no one to care for them. As with James Douglas, it is probable that John Mcfadzen had left his partner with children and financial difficulties to participate in conflicts abroad—most likely the French Revolutionary Wars. Following Downie's death, McFadzen sent a letter dated May 4, 1796 from Fort George in Guernsey to William Callender, indicating that he wanted his mother Marion Beugo to care for Downie's younger daughters Margaret and Maria (NAS CS236/M/9/10.).[62] He and Downie may have even named Maria after Marion, since the name—unlike John, James, Jacobina and Margaret—belonged to no one in the Short line. McFadzen asked Callender (who worked with Robert Renton, the defense lawyer who had sued Jacobina for payment) to arrange the Short girls' affairs, including a one year placement for the eldest at a "fashionable milliner" so she could learn a trade. Explaining that "[t]here must be tutors (guardians) appointed to the

Children instantly, and every thing done in regular form for their benefit," McFadzen nominated himself, his brother-in-law Robert Kid, and Callender as a "Man of business." In the meantime, Downie's creditors launched suits against her daughters. For the proceedings that declared Downie and McFadzen married, and caused Downie to lose her part in the John Short trust also ruled that Downie pay £70 sterling in damages to James and Margaret Douglas. While the Douglases "had not thought proper to do any diligence against their grandfather's widow during her life," soon after her death, Margaret Douglas, acting on behalf of herself and her absent brother, drew up papers against the newly orphaned children.[63] With the Short sisters expecting income from the three-fifths of the trust and the possibility of more inheritance from their mother's side, Margaret Douglas hoped to gain the amount awarded to her and her brother in the earlier suit, and an additional £20 for legal fees. However, her new action meant that the trust fund would be suspended once again, leaving the children who had no other assets, more vulnerable than ever. Though their mother was one of five to inherit from her brother Captain James Downie, she died before receiving her £54.8.8 share, and her children could not access that amount either because it had been arrested already by another creditor.[64] That other creditor may have been McFadzen's mother Marion Beugo, the woman that McFadzen wanted to care for the Short children. She initiated litigation against the girls in order to collect the £103.15.3 Sterling borrowed by her son and Downie from her husband/his father Archibald McFadzen and her brother Gavin Beugo (NAS CS 232/M/18/6). Beugo's case was not pursued. While it is possible that she launched the suit in order to block Margaret Douglas's claim, she too may have wanted to collect an outstanding debt from the children.

The legal proceedings against the Shorts involved considerable confusion and delays. Callender would later testify that when the eldest, Joanna, first visited him,

> "[S]he was afraid she had acted improperly in signing a nomination of a Person to be her Curator, with whom she was perfectly unacquainted, and who, she had been since advised, was by no means a proper person for that office,"

and she showed him two summons filed against her and her sisters for payment of their mother's debts.[65] As minors, the Shorts required guardians to represent them in court (a *tutor ad litem*), and to assume responsibility for their care and education. After their mother's death,

it was undecided who would take those roles, and Margaret Douglas would complain that the challenge of finding willing representatives for the children would delay her own suit against them.[66] Though managers of the Short trust fund, Moir and Keith, would eventually see to the children's needs, they initially and repeatedly demurred, so McBayne, the agent in charge of Captain Downie's estate, was appointed (Ibid). A letter sent to Callender from Inverkeithing in August 1796 indicates that an uncle, a Mr. Hay, agreed to act as their Curator, though the distance and lack of familiarity with the children may have impeded both willingness and capacity.[67] By his own testimony, it would appear that Callender would try to do right by the Short children. Both Joanna and McFadzen advised him of the trust fund still in play, and in trying find out about the legacy and the action to determine the rightful beneficiaries that had been initiated in five years earlier, Callender would become entangled in yet another lawsuit involving a little girl named Maria Short.

As with the Great Telescope and the Gothic Tower, the legal disputes that centred on the trust fund would devolve into physical assault. For in the history of Miss Maria Short, which is a history of wills and willfulness, unruliness was never far away. On seeing a notice for the Douglas suit against the Short orphans, Callender tried to borrow the papers pertaining to the case so he could better understand the situation at hand, but Mr. Moir the trustee had already taken them and was late in returning them to the court. Callender sent a request for the documents directly to the trustee, but receiving no reply, bade someone to retrieve them in person. However, in lieu of Callendar's usual messenger, a Mr. Hunter zealously took up the task. Tracking the documents from Mr. Allister (Mr. Moir's clerk) to an examiner Mr. Nairne and then back to the house of a clerk named Mr. Meikle, in his frustration to get hold of the papers, Hunter seized Mr. Allister by the collar in Parliament Square, marched him from place to place, and threatened to take him to jail shouting, "If you make the least resistance by God I will drag you like a dog!"[68] As Hunter kept him physically detained in the street, a crowd gathered, among them lawyers who offered Allister advice and assistance. They sent for Callender and when he arrived, he paid Hunter, sent him away, and then informed "a very respectable practitioner in the Court [Mr Alexander Forsythe], 'Sir you know nothing of the matter!'" (Ibid). Moir and Allister later filed an action against Callender and Hunter—a suit that is referenced in

a statement by Margaret Douglas that accounts for Allister's refusal to represent the Short girls at court. The action between the trustee, clerk, lawyer and messenger resulted in fines for Callender and Hunter for the unwarranted arrest of Allister, and a smaller one for Moir for not returning court documents on time.

The civil suits between the Jacobina Downie, her daughters, and the relations and lawyers that acted as creditors and adversaries, thus countenance the existence of a Maria Short as the legitimate albeit posthumous child of Thomas Short and uphold details of the narrative presented in 1827 and 1828, significantly by the witness testimonies by Bain, Kidd and Campbell that attested to her identity. As with the later statements, they identify three surviving daughters including Margaret, who, unlike Joanna the eldest, would be raised alongside Maria with financial support provided by the trustees Keith and Moir. The adversarial interactions with her creditors that extended after Downie's death help explain why Maria might later isolate herself from any descendants of the Douglas or McFadzen families that remained in Edinburgh when she returned in 1827. Though nearest relations, by blood, geography and de facto marriage, the two families had not only abandoned her and her sisters as children but also initiated legal actions against them for the little inheritance they had. The story of three orphans sued by relations is certainly a sad one, and it is difficult to determine whether anyone—relatives or trustees—had their interests in mind. They may have desired the girls' money but certainly not their legal troubles. Margaret Douglas held fast to her suit against them, but received a penalty and a scolding in the end. After three years of litigation and delay, she saw her claim denied and was charged the full expense of the proceedings. In summarizing the case, the Shorts' defence had asserted,

> Though they knew that the petitioners [the Shorts] did not represent their mother and were not liable for any debt due to her, the pursuers wished to avail themselves of the petitioners' helpless situation, to grasp at the petitioners' fund of subsistence in the hands of Mssrs Keith and Moir. This design considering the pursuers near relations to the petitioners, was of the very worst complexion.[69]

The Short girls disappear from record after July 1799, when the court finally settled the Douglas case against them, and Keith and Moir agreed to take responsibility for the care. What happened to them afterwards remains a mystery. Joanna and Margaret fade completely from record, while Maria—or someone claiming her identity—would return only twenty-eight years later. In the one letter to Town Council that mentions her mother, Maria claimed that "harsh measures" had injured her health and lead to her death, "leaving her infant children without a friend to vindicate their cause" (Maria Short to Town Council, 22 March 1828, Appendix B).

The Archive of Maria Theresa

Having sought Maria Short in the archives of Edinburgh, I uncovered glimpses that divide her life chronologically into two periods—childhood and middle to old age. Between them lies a caesura that only speculation or a willingness to trust Maria's unverifiable and vague account can bridge. Papers from the 1790s kept at the National Archives of Scotland outline the legal woes of her childhood, and then there is nothing until 1827, when letters, minute books, legal documents, newspaper articles and various ephemera referencing her activities as an adult begin to appear. While writs from the 1790s contain information that accords with the attestations of identity from 1828, the intervening three-decade gap makes impossible a definitive linkage between child and adult. Moreover, that breach is marked by a nominal change that sees Maria Short become Maria Theresa Short and the provenance of that middle name generates further questions. Was the absent "Theresa" there all along or was that moniker adopted later in life?

That an online search of her name will generate links to Maria Theresa of Austria (1717-1780) may be construed as more than coincidental. For connections can be drawn between the founder of Short's Observatory and the only woman to rule the Habsburg line. While British support of the Austrian monarch against France during the War of Austrian Succession (1740-1748) might have inspired namesakes in eighteenth-century Scotland, isn't it curious that the Holy Roman Empress faced a similar problem as a daughter born in place of a recently deceased son? Perhaps the trouble occasioned by the accession of Maria Theresa to her throne influenced the naming of a baby girl from Calton Hill. The royals however had prepared for the

absence of a son, with Charles VI promulgating the Pragmatic Sanction to set the stage for a female heir. Nevertheless, the crown princess would attribute the difficulty of asserting her claim on his lands to the inability to quickly retrieve necessary documentation, and so at the ensuing war's conclusion she would include a new archive within her program of government centralisation and reform.[70] Being founded on a woman's struggle for property and title that had traditionally passed from father to son makes the Viennese archive assembled by Maria Theresa of Austria in 1749, in some way analogous to the archive assembled by Maria Theresa Short in 1827. Short gathered and applied government documents to establish her claim, and remnants of that activity endure in the Edinburgh City Archive.

To make her case again the Town Council of Edinburgh, I earlier noted that Maria employed documents concerning the city's agreement with her father that are kept within its own records—an action that resulted in the transfer of Great Telescope into her possession and a grant for the use of municipal land on Calton Hill a few years later. Her letter to Town Council, dated January 8, 1828, begins "Gentlemen, The papers which were freed into my possession for perusal I have carefully examined…" and it subsequently outlines a detailed argument that refers to a series of old writs and invoices. Longer and more forceful correspondence followed and on March 22, 1828 (Appendix B), Maria wrote,

> Almost every fact stated in my Memorial is confirmed in the Extracts. The City Records show that my father when he came to Edinburgh for the purpose of establishing an Observatory possessed considerable property in and near the city which I can prove (if requisite) was exhausted in lawsuits etc.

Alongside the very documents she cites, four letters written by Maria to City magistrates in 1827 and 1828 remain stored in the Edinburgh City Archives as part of its Macleod Collection of loose manuscripts and printed writs, which according to city archivists dates to the turn of the twentieth century or earlier.[71] Bundle D0105R holds Maria's correspondence along with papers concerning the observatory project of Thomas Short. It contains writs, reports and extracts related to the construction and maintenance of his Calton Hill project that date from 1776 and a relatively consistent stream of documents terminates in 1811, with the proposal of a new observatory project printed and submitted by the Astronomical Institution. Town Council soon

after ended their agreement with the Douglases (then absent or deceased) and granted their buildings and grounds to the freshly founded organization that would go on to build what later became the Royal Observatory. Documents in the bundle then skip ahead to 1827 and refer to Maria Short and her case against the city. Alongside Maria's correspondence, papers from that period include the letter from William Wallace suggesting her identity be verified, and Maria's response—the group of signed attestations accompanied by a letter of introduction and support from Thomas Fleming. The bundle also contains an undated and handwritten prospectus for a popular observatory (figure 8), which is probably Maria Short's. Extracted copies of eleven Acts of Town Council, which date between 1776 and 1807, are transcribed by the same hand onto paper watermarked 1827. It therefore seems reasonable to assume that they comprise the documents that were given to Maria Short for her perusal. Since its contents centre on her claim, the bundle may have even been originally assembled on her behalf in 1827 or 1828. Otherwise it would include papers pertaining to observatory building in Edinburgh that had little to do with Thomas Short, such as earlier efforts by the mathematics professor MacLaurin and later ones by the Astronomical Institution, or it could have included papers related to Maria's later concerns. Nevertheless, that bundle became a significant and cited source when historians began researching astronomy in Edinburgh in the final decades of the twentieth century. By then Maria Theresa Short was likely long forgotten, but Bundle D0105R stored a part of her story. In other words, through the extraction of old rulings and the consolidation of papers linked to her reclamation of the Great Telescope, Maria participated in the reorganization of the archive itself—making it easier for later researchers to explore the same documents and inadvertently retrieve her story while researching the observatory of her father, which historians had already begun to document.[72]

Besides the bundle at the Edinburgh City Archives, there is another trace of archival activity from 1827 and by placing the 1828 attestations of Bain, Kidd and Campbell into further doubt, it complicates the question of Maria's identity. Because the case between Moir, Allister, Callender and Hunter involved the borrowing of papers from the Douglases v Shorts dispute, one possible outcome of the suit between the agents and messenger is the keeping of an inventory within the Douglases v Shorts bundle, that recorded each time its papers were taken

from court. No other bundles that I unwrapped contained anything comparable. As expected, almost all of its noted retrievals date to the late 1790s when the suit was active, and the borrowers are generally identifiable as clerks, trustees and lawyers named in the proceedings or in related cases. However, the last entry indicates that a Mr. Grierson withdrew "the whole writs" of its inventory on October 3, 1827—two months before Maria's first letter to Town Council. What purpose did those papers serve almost thirty years after their compilation? If the Douglases v Shorts file helped me reconstruct the past, couldn't it also help someone fake an identity? The names of Maria, her sisters, and the trustees Moir and Keith all appear within its documents. While there is information sufficient to form a picture of troubled childhood, as I have done, there is also enough there to coach the 1828 attestations. The inventory notation therefore opens the possibility that the names and narratives provided to connect the woman who called herself Maria Theresa Short after 1827 to persons at the end of the previous century may have come from the very sources that I hoped would prove their veracity.

While there is only circumstantial evidence that Maria Theresa Short or one of her agents read the case files, her reasons for retrieval could have still been legitimate. They might have been trying to find out if any of the trust remained, as well as trying to gain a better understanding of the events and relationships that marked Maria Short's past. But if Maria read those documents, what others from the archive might she have seen? Of Jacobina Downie's actions, her daughter wrote only:

> It has been alleged that Mr. Short's widow had abstracted the Telescope from the Observatory, to this I have to say my Lord at my Father's death my then surviving parent under the impression that in consequence of the Nonfulfilment of the Contract the telescope belonged to her children *did* keep possession but as the extracts prove was forcibly dispossessed and such harsh measures used as to injure her health (Maria Short to Town Council, 22 March 1828, Appendix B, original emphasis).

There is no telling what more she knew of the mother lost when she was eight. However, Maria Short and the building that holds some of the keys to her identity are of the same vintage. The General Register House, founded to hold Scotland's national records in 1765 and opened for public use in 1789, also houses the papers that document the civil suits between relatives, neighbours, and ordinary citizens—everyday, albeit life-altering, disputes. Less two centuries of

accumulation, locating records from the 1790s may have been easier in 1828 than it is today. As the returned migrant Scot searching for clues to her past, it is possible to consider Maria a precursor to today's genealogical researchers who search the archives to learn about themselves through the history of their families?[73] With my research using methods and sources akin to family history, is it possible that I shadowed Maria Short in my progress through the archives all along?

Maria's letters and their citing of evidence possess an impressive, cogent, and articulate voice, but encountering the 1827 watermarks and inventory entry affected me with the uncanny sense of meeting my double. It struck me that in researching my subject, as another stranger in the archives of Edinburgh I may have unwittingly re-enacted the research that Maria herself had done. In his essay on "The Uncanny," Freud explains that the "double has become a vision of terror" and describes the uncanny feeling that emerges from being lost and unintentionally retracing the same steps, "when every endeavour to find the marked or familiar path ends again and again in the return to one and the same spot, recognizable by some particular landmark" (10-11). The landmark in my case is Maria Short, coupled by nagging returns to the possibility that she was an impostor. Therefore, I encountered two Marias in the archives: the Maria that was searching, and the Maria that was lost. Their dual existence unravels the possibility of learning the truth about Maria Short that I naively imagined the Archive could solve.

The Grimm brothers' story of "The Willful Child" acts as a touchstone for Sara Ahmed, who recounts the tale in the opening of *Willful Subjects* (1) and again in its followup, *Living a Feminist Life* (66-67). It tells of a girl who refuses to obey her mother and is then condemned to illness and death because her defiance displeases God. Yet her willfulness does not cease, even after the girl is buried. Her arm reaches out from its grave and will not back down until her mother strikes it with a rod. Ahmed writes, "Note that willfulness is also that which persists after death" (*Willful Subjects* 1). And she furthers,

> Willfulness involves persistence in the face of having been brought down, where simply to "keep going" or to "keep coming up" is to be stubborn and obstinate. Mere persistence can be an act of disobedience" (2).

Persistence appears to be a Short family trait. What I found in their archive is a history of willfulness and as Ahmed explains, "A willfulness archive would refer to documents that are passed down in which willfulness comes up as a trait" (*Willful Subjects* 13). Moreover, I would characterize the history of Short willfulness as battles of will, or more specifically battles over wills—contestations over the authorized, postmortem execution of intentions. The willful Shorts that challenged some preordained will include Maria's father, Thomas, who contested the will of his older brother James Short and after that, the will of the established heir James junior; Maria's mother, Jacobina Downie, who fought for the inheritance of her husband's assets and the trust fund set up by John Short junior; and Maria, herself, who reclaimed what little her father had inherited but her mother had lost—the Great Telescope. Not one of those Shorts was a child when they made their claims, but their willfulness may have provoked their infantilization. Instrument historians represented Thomas as the hapless baby brother overlooked in favour of his nephew (the oldest son of an oldest son); magistrates disallowed his child bride Jacobina from claiming the potential independence offered by widowhood by declaring her remarried against her consent; and the supporters of Maria Short described her as a daughter, a niece and an unprotected female despite her being a forty-year-old woman in 1828.

Treating the willful Short subject like a child, marks them as disobedient—in need of discipline and reform. Is willfulness genetic or predisposed? Perhaps a culture of litigiousness came with the preponderance, or even excess, of lawyers in Edinburgh who had long been instrumental to the ruling of Scottish society by landed aristocrats within a union presided over by government in London.[74] Jacobina would have seen her husband involved in suits throughout her first marriage. For example, documents in the Edinburgh City Archive indicate that even after the death of Thomas, the matter of who would pay for the labour already completed on the still unfinished Observatory remained unsettled. The young Mrs. Short may have therefore learned about being both a plaintiff and a defendant before the death of her first husband, while Maria Short's first tastes of the law would have begun in infancy. Her birth, as a girl, set in motion eviction, raid and criminal trial, and she was a defendant by age seven or eight, sued by the relatives who had made loans to her mother. However, it is also possible that Maria Short

became a litigious and willful subject much later and because of the archive itself. Reading about all of that willfulness in the archives may have shaped her own approach.

The willfulness archive of Maria Short emerges from a type of media apparatus, which communications and media theorist Jeremy Packer argues "include a far greater range of technologies that work to link together—to mediate—various institutions and forces" (90). Citing Giorgio Agamben, Packer characterizes an archive as a Foucauldian apparatus because it is "intended to alter (or, in more Deleuzian terms, *capture*) human behaviour and thought" (91, original emphasis). Agamben defines an apparatus as a "heterogenous set that includes virtually anything linguistic and nonlingusitic" that has a "concrete strategic function [and] appears at the intersection of power relations and relations of knowledge" (19-24). He explains that "every apparatus implies a process of subjectification, without which it cannot function as an apparatus of governance" (19). Subjectification, however requires a process of negation and desubjectification, and Agamben offers the connected example of confession and penance, which enable the "constitution of a subject" (20). The juridical, statistical and municipal records that constitute the willfulness archive of Maria Short, likewise parse and create governable subjects even if Short's application of their contents, like her use of optical instruments and public space, defied the establishment.

Anyone reading that archive however, could identify the Shorts as willful subjects, and so treat them and their descendants accordingly. However, while such records may have initially been generated for administrative purposes, their users and applications have since changed. So many family researchers use the archives in Edinburgh that the "official guide" of the National Records of Scotland is titled *Tracing Your Scottish Ancestors* (Clarke, 2011). Paul Basu argues that the popularity of Scottish roots tourism, recognized and encouraged by the Scottish government is largely driven by a powerful cultural narrative promoted by novels and popular history, which conflates the Highland Clearances with Scottish migration and creates a sense of belonging through a shared heritage of imagined exile and the misappropriation of the term *diaspora*. However, he remarks along with a general interest in popular genealogy, emerge issues related to "current discussions on globalization and localization, mobility and identity,

transnationalism and multiculturalism, the perceived loss of continuity with the past" (133). It is therefore possible to consider the family historians' need to know their genetic origin as resulting from a discourse of desubjectification, and the constructions of family trees as processes by which they reconstitute themselves and their relations as new subjectivities.

As a returned Scot, potentially in search of her roots, Maria Short may be not simply a willful subject, but also a precursor to this relatively recent trend. On "a politics of the imagination in which the past becomes a place of succor and strength" (76), Carolyn Steedman contends,

> In the project of finding an identity through the processes of historical identification, the past is searched for something (some one, some group, some series of events) that confirms the searcher in his or her sense of self), confirms them as they want to be, and feel in some measure they already are (77).

To imagine Maria Short as an archival researcher and family historian therefore is to imagine her compelled to practice historical identification, which functions beyond recognitions of pedigree and property rights. Popular genealogy may bear problematic associations with essentialist notions of biology, culture and rootedness, and so operate in ways that oppose Foucauldian genealogy which seeks the "dissipation" of a stable identity (Foucault "Nietzsche, Genealogy, History" 95). However, as Catherine Nash explains,

> The genealogical quest to know with certainty "who you are" and "where you come from" by knowing your ancestors suggests a primordial and predetermined identity that can simply be uncovered…Yet genealogy is also often a practice of self-definition and self-making, of choosing which apparently determining ancestries matter most (17).

And so when I think of you, Maria Short, conducting research in your willfulness archive, I do not simply imagine you reading about a little girl denied her inheritance and sued for what little resources she had. Instead I picture you selectively shaping the story of Thomas Short as a "man of genius," who was "too mild a disposition to give offence" (Short to Town Council, 22 March 1828), while secretly identifying with the indomitable Jacobina Downie, and maybe even Elisabeth Beverly and Margaret Douglas, as you consider how to represent your cause. Whether or not you were the real Maria Short when you entered and added to the willful Short archive matters little. What matters is how you responded—what you made of what you found there, and what you then made of yourself.

II. A Spectacle to Popularize Science (1828-1834)

The Great Telescope and its Disposal

> "To abbreviate: femininity is a willing resolution. But to be willing one's femininity, even willing not to be willful, can be to fail the resolution: (Ahmed *Willful Subjects*, 90).

Maria Theresa Short probably never expected to exhibit a splendid camera obscura, and it is likely that her popular observatory only existed due to the failure of earlier plans. Having gained possession of the Great Telescope and official recognition as the daughter and niece of Thomas and James Short, she next attempted to secure a living through the instrument's sale. In other words, the opening of Short's Observatory and its camera obscura depended not only on the acquisition of the Great Telescope by Maria Short, but also on her inability to dispose of it. Since it was unwieldy and in very poor condition, instead of seeking an individual buyer, the optician's daughter and the shawl manufacturer Thomas Fleming devised a plan for a sale by subscription. Fleming wrote to Town Council in June 1828, indicating their intentions, and the notion that Short wanted to sell the instrument to earn an amount sufficiently substantial to see to her own care, and that may have even tipped their ruling towards Maria's favour (ECA D0105R). Contemporary ideologies of marriage, motherhood and "female dependence" would have positioned Miss Short as a spinster without any apparent means of financial or familial support, and therefore a "social problem" (Gordon and Nair 167).[75] Town Council may have, at Short's insistence, recognized the City's part in her family's misfortune, and as well, the value in trying to prevent the economic fall of woman of a local and once-lauded name. Nevertheless, even though they would characterize the compensation granted as charity, the local professoriate protested.

The university senate resolved that the instrument, though no longer of scientific or pedagogical value, could not legally be sold by lottery for the benefit of a private individual since it had been gifted for public use. The transcription of their protest, which refers to Maria as "a person claiming to be a descendant of Mr. Short," appears in the Town Council minutes of December 3, 1828, having been submitted by Principal John Baird alongside a copy of the November 22 "Minutes of the Senate Academicus" (ECA TC Minutes [204] 305-307). The

university senate minutes indicate the decision to protest Maria's claim on the Great Telescope as their first item of business, following a report by their legal scholar, Professor Napier who had examined the documents in question.[76] The intercession nevertheless surprised the city magistrates who noted that the telescope had "been laid aside as lumber for the past 25 or 30 years" (3 Dec 1828, ECA TC Minutes [204] 307). How did Town Council respond? They directed a copy of Town Council minutes be forwarded to Baird and his colleagues to show that they had already ordered the delivery of the telescope to Maria. However, what the professors did subsequently is remarkable.

Rather than thwarting the sale of the Great Telescope, the university helped promote it. It seems as though Baird and colleagues reconsidered their opposition to Fleming and Short's scheme. Did they hope that whoever procured the instrument would donate it to the school or its affiliates at the Astronomical Institution? After all, at over 12 feet long, it would have been too large for most people to handle or store. In February 1829, Baird and the professors of natural history (John Leslie), mathematics (William Wallace) and moral philosophy (John Wilson) signed a joint letter of goodwill to Maria for reproduction in a letter campaign. Attesting to the scientific contributions of James Short, acknowledging Maria as his niece, and recommending her cause to potential donors, the message from the professors reads as follows:

> We, the undersigned, most willingly concur in bearing testimony to your Uncle's high reputation as an Optician; to the great service he did to Astronomical and Optical Science, and to the honor that accrued to the British nation in having produced so distinguished a character. Therefore, as the relative of James Short, we do wish you success, and respectfully recommend you to the attention of such as are disposed to show regard to the Improvers of science by acts of kindness to their posterity.

Short prized the letter of support from the university professors and reused it multiple times. Copies appear alongside different requests in various archival collections (figures 7c, 12a, 13b).[77]

In Edinburgh, the structure and operation of its university shaped the local and patriarchal character of science. From its founding in 1583 until Scottish university reforms in 1833, its

municipal patrons controlled the school. Along with their civic responsibilities, the thirty-three members of Town Council supervised the maintenance and administration of the university including hiring and paying base salaries to most of the professoriate. While open to negligence, corruption and nepotism, Jack Morell observes that during the eighteenth century, Town Council acquitted itself rather well, transforming the school from a small college of arts and divinity into a university of medicine and science, and increasing enrolment at a time when many British and European schools saw fewer students. It achieved eighteenth-century renewal by remodelling the school after the Universities of Leyden and Utrecht. Replacing the medieval system of regency, which comprised limited teaching terms for recent graduates, it sought talent for tenured chairs responsible for specific subjects and expanded medical teaching by adding faculty positions and introducing clinical instruction, building and renovating local infirmaries. As Morell explains, "The financial interests of the city were directly connected with the ability of professors to attract students to its university" ("Science and Scottish University Reform" 43). That coupled with the relatively small size of its faculty fostered a local discourse of celebrity-scholars and scientific heroes. Maria Short would draw on this scientific celebrity culture by calling herself, "Daughter and Niece of men celebrated for their Genius" (Letter of Maria Short to Town Council, 22 March 1828).

By claiming blood ties to James Short, Maria also connected herself to one of the university's most significant hires—Colin Maclaurin, the renowned Professor of Mathematics who had been James's mentor and who initiated the first observatory scheme—as well as a tradition of nepotism that helped build the university and its reputation. The other momentous hire was Alexander Monro primus, the first of three Alexander Monros that would occupy the chair of anatomy, and whose 1720 appointment at the cost of two existing lecturers was championed by his father, John Monro (former Deacon of Surgeons, and ex officio Town Council member). Both Monro and Maclaurin would be crucial to determining the shape of science in Edinburgh. Monro primus's ability to attract students from outside the city would facilitate the building of its "famous school of anatomy" and establish the university's reputation as a school of medicine (Morrell, *Science, Culture and Politics* 6-7). Maclaurin, on the other hand, was elected as an outstanding researcher championed by Isaac Newton, having become a fellow of the

Royal Society in London at the age of 21. Lifetime tenures for Monro, Maclaurin and their colleagues were meant to promote *Lehrfreiheit* (academic freedom), so their reputations as scholars and educators would benefit both the university and the city. Maclaurin, however, had a terrible teaching record: at Aberdeen's Marischal College, he had collected his salary while ignoring school duties because he was too busy tutoring the son of Lord Polwarth, an appointment that he neglected to resign until a year after being hired in Edinburgh (Ibid 85-86). Still, D.J. Bryden reports that Maclaurin attended to his Edinburgh post, attracting about "a hundred pupils every year...[and] enthusiastic for the higher branches of mathematics, teaching a syllabus that also embraced the useful applications of the discipline" ("The Edinburgh Observatory" 448). Maclaurin's previous record and improved attitude towards university work likely correlated with Town Council's unique payment structure. As an alternative to high fixed salaries, such as those enjoyed by faculty at Oxford and Cambridge, Edinburgh's low base salaries supplemented by class fees were meant to promote pedagogy and discourage sinecure.

Along with the reputation of its faculty, Morrell cites flexibility and relative openness as being among the attractions held by the University of Edinburgh ("Science and Scottish University Reform" 46). Although Sophia Jex-Blake, in petitioning for the right of women to obtain medical degrees from Edinburgh, argued that within its original Charters "no words are used which in any way exclude women," like other universities it was effectively closed to women (10).[78] However, the school opened its doors somewhat and offered more flexibility than many of its contemporaries—enrolment required no religious affiliations, entrance examinations or prerequisites, and tuition and subsistence costs were relatively low (Morrell, "Science in Manchester"). This benefitted the city by attracting students from all over, and supplying a relatively inexpensive education to its own citizens. Reasonable class fees meant poorer (lower middle-class) students could attend school at least part-time, but connecting fees directly to teaching wages motivated professors to seek large class sizes since each student represented a relatively small portion of their income. All students had the option of taking any classes they chose, in any order or in any quantity. Professors focused on individual courses rather than complete programs of study, making graduation a low priority (Ibid 45). University teaching in Edinburgh consisted primarily of lecture courses, and when appropriate, demonstrations of

experiments, specimens, and scientific apparatuses. Practical work outside of lecture halls may have included field trips and excursions to the Natural History Museum or the Botanical Gardens, but laboratory teaching was practically nil before 1840—possibly because it could not accommodate large numbers. More ambitious students took local private classes (which could admit women) or continued studies elsewhere, while others became part of a larger local audience for science, which had been facilitated by a professoriate eager for more students and their fees.

The university professors nevertheless comprised the core of the city's scientific community. They were all men, typically native Scots, middle-class or higher, and often related to another member of faculty (Clark 222). Taking medicine, mathematics, astronomy, philosophy and natural sciences into account, the second half of the eighteenth century saw at most forty science chairs at any one time, and base annual salaries for these tenured positions ranged from zero for chemistry to £128 for botany. Obliged to supplement their pay with income from class fees, some professors would change disciplines for more money. It was an arrangement that encouraged teaching and discouraged specialization. Describing the University of Edinburgh, William Clark writes

> And one of the famous universities of the age amounted to a rather small community, bound by ties of blood not only spilt in faculty meetings. Scottish universities remained complex and inter-related moral communities, not unlike craftguilds. Here as in traditional societies, the private life remained fused with the public or professional life (Ibid 226).

The very structure at the University of Edinburgh demanded that the professoriate pursue and protect their own popularity as a means to earn income for themselves and for their research. Jack Morrell calls the old pre-reform system "pre-bureaucratic" ("Science and Scottish University Reform" 42).

Adopting diverse entrepreneurial approaches to student recruitment, three Edinburgh professors—Robert Jameson, John Leslie and Thomas Charles Hope— blurred showmanship with scientific pedagogy (48-55). All active during the 1820s (around the time when Maria Short arrived in Edinburgh), each significantly augmented their incomes by finding ways to attract large numbers to their classrooms, thereby building a local audience for popular science by

making entertaining spectacles central to their pedagogical styles. Regius Professor of Natural History Jameson, "a feeble lecturer who lacked charisma," increased his class from 50 to 200 by 1826 by attracting students and numerous townspeople through offering a comprehensive list of lecture topics for his already popular subject, showing numerous specimens, hosting field trips, making himself available outside class hours, and as Regius Keeper of the Natural History Museum, offering free admission to all of his students (Ibid 49). When John Leslie, shifted chairs in 1819 from Mathematics to Natural Philosophy, his base salary dropped from £148 to £52 making him more aware than ever of his dependence on student fees. When visiting France in 1814, Leslie learned that French savants earned £5000-£6000 per year, and so his request was relatively modest when he suggested to Scottish University Commissioners that annual professorial incomes be increased to £300 (Ibid 51). Unable to make his subject compulsory for medical students (which would have doubled his enrolment), Leslie's class size remained steady at 150 students from 1819 to 1826, although he offered a broad range of topics, with approximately 1000 lecture-experiments. Still the lack of prerequisites and the consequently low mathematics ability of many students frustrated Leslie, obliging him to adapt his pedagogical approach. Leslie attempted to fix the challenges inherent to uneven aptitudes and expectations, by proposing two classes: "the specialized and mathematical; and the elementary, qualitative and popular" (Ibid 52). Though his bid to offer an advanced class ultimately failed, his elementary class begun in the 1826-1827 academic year was exceedingly popular. Still Leslie never achieved class sizes like those of chemistry professor Thomas Charles Hope. Though he was given no base salary, Hope taught a popular, practical and compulsory subject, and built on those advantages by eschewing research altogether. Regularly lecturing to over 500 students at once, with large, custom-built demonstration apparatuses, as Morell claims, "One person in 300 in Edinburgh attended his lectures" (Ibid 54).

In 1826, when Hope admitted women to his class, Lord Cockburn snidely reported that some students brought dates (Ibid 55). Four years later, David Brewster criticized the state of Scottish science by parodying the mercenary showmanship of university classes:

> No sooner is a professor installed behind the counter of his lecture-room than it becomes his single object to enrich himself with the fees of his ready-money customers. His handbills

> announce the quality of his wares;—the cups and balls and the fire-works of science are summoned into requisition, and by the legerdemain and alchemy of his art he transmutes his baser metals into gold (Brewster "[Review of] Reflexions on the Decline" 326).

University faculty were essentially "freelance independent teachers" in a system that rewarded class size over student excellence, where "every man and his fee were welcome" (Morell "Science and Scottish University Reform" 46). While low salaries prompted instructors to earn extra money through private instruction (which would have been available in some instances to women), the focus on class size could provide additional educational opportunities (as in the case of Hope) making the Scottish university system more open than after its 1833 reform (Yeo "Medicine, Science and the Body" 157).

Although there is no evidence of Maria Short having any scientific instruction, the structure of the University of Edinburgh affected her and her observatory-building predecessors in at least three ways. First, the low base salary and competition for students may have prompted Maclaurin's successor Matthew Stewart to deplete the observatory fund that might have paid for the completion and equipping of Thomas's observatory, which would have considerably changed the circumstances of Maria's childhood. Second, reliant on class enrolment and patrons for income and research funds, university professors themselves brought together science and marketability. Instead of embezzlement, most professors wanting to improve their finances would apply tactics such as chair-hopping for better base pay or more popular subjects, and sought alternative means of support such as private tutoring, public lecturing or elite patronage—all activities that depended on gaining favour outside the exclusive and masculine domain of academia. University policy therefore multiplied the sites of science across the city and opened them to the participation of women and other amateurs through the extracurricular activities of its faculty, while inside some classrooms its impact on instruction took spectacular effect. Third, the lack of funding for equipment and facilities encouraged affiliations between researchers and private individuals and institutions, and that fostered University and Town Council involvement and interference with the projects of Maria Short and her predecessors.

Astronomy was "*the* eighteenth-century science" (orig. emphasis, Morus *Physics* 192). Although the new science of electricity offered astonishing new spectacles, Iwan Rhy Morus explains that a solid grounding provided by Newtonian laws and the importance of celestial knowledge to navigation (and therefore imperialist military needs) made the science of the heavens ascendant. The loftiness of its status in Britain and an appeal to local pride thereby formed crucial elements in the campaign to sell the Great Telescope. Stargazers such as Copernicus, Galileo and Newton had participated in the first Scientific Revolution, whereas the mapping of the skies by the Herschel siblings, William and Caroline, in the decades surrounding the turn of the nineteenth century, would prove a large part of what many considered the Second Scientific Revolution (Ibid). Reigniting popular interest in astronomy, the 1781 discovery of Uranus by William Herschel was based on his improvements to telescope construction and Caroline Herschel would eventually draw her own small salary from the British Royal Family in recognition of her propensity for finding comets (Holmes, *Age of Wonder*).

The success of the Herschels may have reminded enthusiasts in Edinburgh of the achievements of James Short, and the failure to equip an astronomical observatory in their own city. As a supplier of telescopes to many of the world's observers—both amateur and institutional–James Short had played a significant role in the promotion of eighteenth-century astronomy, while the Herschels' discoveries coincided with the attempts by Thomas Short and his successors to mount a working observatory in Edinburgh. The unrealized plans of eighteenth-century men of science—Maclaurin, Short and their patron, the Earl of Morton—resulted in more failure by Thomas Short and his grandson, James Douglas. Subsequently, the private Astronomical Institution rekindled astronomy in Edinburgh. Their establishment in 1812 to build a jointly owned facility for astronomical research and popular observation predated the Astronomical Society in London, which in 1820 was the first breakaway group to challenge what its founders (Charles Babbage, Francis Baily, Benjamin Gompertz and John Herschel) considered the corrupt and despotic rule of the Royal Society. Joseph Banks, the long-time president of the venerated institution, had privileged patronage networks and natural history over mathematical sciences (Morus *Physics* 36-39).

Nevertheless, the promoters of astronomy in London would transform the practice and status of science in ways that would see to the limiting of popular (i.e. non-expert) participation around the same time that Maria Short became active. However, what is commonly understood as the professionalization of science was a complex process of disciplinary boundary work that drew on and then rejected popularization, which itself is an unstable notion. In Edinburgh, the scientific observatory built by the Astronomical Institution achieved Royal status in 1822 after the visit of George III, which made way for its eventual transfer from private to government control. Financial problems led to the difficulty of properly equipping the place for decades, and the popular component of the institution would languish in the 1830s after the appointment of its first full-time observer Thomas Henderson. While popular interest in science spread to the non-elite, thereby making room for Maria Short and her projects, Henderson effectively shifted the direction of the Royal Observatory in Edinburgh towards research—a trend that would develop with a more industrialized form of scientific production that Morus argues George Biddell Airy pioneered at the Royal Observatory in Greenwich after being appointed there, one year after his counterpart in Edinburgh (*Physics* 197-98).

The lone Romantic figure dedicated to exploring the heavens from a lonely watchtower was by the 1830s no longer a sustainable notion. Its contributions to maritime power through its advancements in navigation, problems of longitude, and time signalling, meant that astronomy had strategic and economic significance, and as such, often performed under states-sponsorship. Astronomical observatories helped develop methods that enabled accurate positioning at sea through the production of star charts and the regulation of time. These systems—crucial to naval operations, as well as overseas trade—were by and large achieved through the collaborative collection of information by astronomers located all over the world, who shared measurements and calculations from their observations through correspondence and publications of tables and almanacs (Ibid). Morus explains that Airy managed Greenwich using a “factory mentality” that produced and processed as numerical data, at an industrial rate (193). The Astronomer Royal for Scotland, Thomas Henderson lacked a bank like his counterpart Airy’s that consisted of “obedient drudges—the observers and [human] computers who did the work” (Ibid)—but he too generated prodigious amounts of numbers and their

calculations. In fact, he was too busy with his observations to fulfill his teaching responsibilities at the University of Edinburgh (Hermann Brück, 20). Notably, both Airy and Henderson had the splendid camera obscuras installed in their facilities disassembled within four and five years of their appointments to make way for observational equipment. The move signified an end to the popular components of their venues and a definitive realignment of priorities.

The industrialization of astronomy however had its critics, and the most vocal among them was a young writer and would-be observer named Thomas Carlyle. Having seen newspaper notices for the position of the first full-time astronomer for Scotland in 1833, Carlyle sent an inquiry directly to his influential friend, Francis Jeffrey, even though he would later admit that he "had hardly ever looked through a telescope" (Carlyle, *Reminiscences* 378). As a Whig reformer, Lord Jeffrey was considerably more liberal than conservative Carlyle, but he had become a family friend and was especially fond of Jane Welsh who had wed Carlyle in 1826. Jeffrey's refusal to support Carlyle's aspiration would sting for decades. In a letter to his brother, Carlyle describes Jeffrey's reply as a "kind of polite Fishwoman shriek" (to John A Carlyle, 21 January, 1834) and then revisits the matter in *Reminiscences* near the end of his life (first published posthumously in 1881). Carlyle recalled, "[I] fancied myself in the silent midnight interrogating the Eternal Stars, etc., with something of real geniality" (*Reminiscences* 379). Although Carlyle admitted that Scotland's first Astronomer Royal Thomas Henderson had done "well enough," he referred to him exclusively as Jeffrey's "blear-eyed" old secretary (Ibid 373, 379). Nevertheless, prior to the affair, Carlyle had already written several articles for David Brewster ("on most frugal terms always!" Ibid 263) and in his 1822 article for Brewster's *Edinburgh Encyclopaedia* on Blaise Pascal, he expressed his dismay at the emerging emphasis on computation, deriding Pascal's "famous arithmetical machine" as a kind of "mill" (Secord *Visions of Science* 222). Carlyle's 'Sign of the Times' essays for *The Edinburgh Review* "attempted to draw out the consequences of a world dominated by machines and mechanical thinking" (Ibid 224). Charles Babbage, with his differential engine (widely considered a precursor to the modern computer) and his push towards a mechanized form of scientific professionalism, represented an anathema to Carlyle who described him as (among other things), a "mixture of craven terror and venomous-looking vehemence" (qtd in Ibid 225). The Romanticism of Carlyle, which would be both nostalgic and

forward-looking, as an inspiration for scientists to come, demonstrates that despite a shift in the 1820s and 1830s towards less-accessible forms of astronomy, there remained a desire to identify with the geniuses that had communed with the heavens.

Romanticism and Enlightenment

On December 5, 1829 a notice appeared in *The Scotsman* newspaper describing the sale of Short's Great Telescope as a form of "enlightened philanthropy." It announced that an individual had been calling on "gentlemen in Edinburgh and vicinity" to gather subscriptions, but added that anyone "interested in the progress of art or the advancement of philosophy" could join the campaign by visiting "Fleming's Warehouse, 31 South Bridge." Eleven days later, the newspaper published a response from a reader that read like a second advertisement. Extolling the accomplishments of James Short and advocating the support of his niece as a form of gratitude and recognition, its writer drew on local pride by placing the telescope-maker within an constellation that included Newton and Galileo, and credited his part in "so many discoveries." The "Constant Reader" who signed as "X," upon addressing "every thinking person," concluded,

> As a well wisher to the cause, I should conceive that the appeal contained in the advertisement above alluded to, will be duly appreciated by the generous and enlightened of all denominations. For the honour of those who "give their days and nights" to the cultivation of science, it is to be hoped that many will embrace this opportunity to show their regard for it" ("Short's Reflector" in *The Scotsman*, 16 December 1829, 6).

Copies of a letter campaign, sent to individuals between 1829 and 1831, are now housed within collections of correspondence archived in Edinburgh. They include a printed introduction by Fleming, and the reproduction of a letter from the university professors, and some also hold a flyer addressed "To the Nobility, Gentry, etc.," and an illustration of the telescope that lists its specifications (figures 7a,b,c, d).[79] Fleming's letter, printed with blank spaces for filling in by hand the date and name of the recipient, focuses on the scientific contributions of Maria's uncle, explaining that "the labours of Mr. Short may justly be regarded as having been the medium by which the exalted speculations of Newton were at first made tenable." It asks "the enlightened enquirer" to contribute to the campaign for the "behalf of his female relative, the

last of her Family." The flyer, likewise explains that the "comfortable establishment of life of the only surviving relative of these Artists depends on the Successful sale of this Instrument." And drawing on information likely gleaned from the letter in City Archives by Elisabeth Beverly, it notes the original 1200-guinea value, and describes the misfortunes of Thomas Short as being "entirely owing to his disinterested executions in endeavouring to extend the limits of the most sublime of all the Sciences." Maria's signature on the flyer, which directs inquirers to Fleming's address, marks her only presence in a campaign that otherwise refers to her exclusively in the third person, and almost always as a relative, niece or daughter. With Fleming frequently describes her as a "deserving female,"[80] she appears anonymous, passive and helpless.

Alongside Maria's relative silence—"willing not to be willful"(Ahmed *Willful Subjects* 80)—, the telescope sales campaign has at least one other feature. As if to facilitate identification with the men of science that its texts celebrate, its promotions address readers as "enlightened." Aside from a handful of nobles and landed gentry, Short's audience likely consisted primarily of the Scottish middle class who formed much of Edinburgh's population. Comprised of businessmen like Fleming as well as professionals, merchants, tradespeople, etc., by the 1830s, this group had developed a "sense of identity and collective solidarity" through geographic proximity, and the pursuit of progress and respectability. Key among their approaches to advancement, were Intellectual improvement and socializing through scientific, literary and professional clubs and societies, where they could also enjoy opportunities to associate with the more learned and the leisured classes. Richard Holmes describes this period and the decades leading up to it as an "age of wonder," noting that the popularization of scientific knowledge through public lectures, societies, and publishing coincided with a discourse that some call *Romantic science*, which introduced the enduring tropes of the dedicated scientific "genius" and their eureka moment.[81] Following a similar narrative, local success stories, such as James Short and his mentor Colin Maclaurin who through diligence and aptitude had both risen in the previous century from relatively modest beginnings, would have appealed to the aspiration, romanticism and sense of nostalgia characteristic of the emerging middle class.

The bourgeois possessed a "longing for the past," that Carolyn Steedman asserts engendered multiple historical disciplines, sites, forms, and genres of the first half of the nineteenth century (91). Phenomena connected to romanticism and nostalgia included the historical novel inaugurated by the celebrated lawyer-turned-writer Walter Scott in 1814 with *Waverley; Or 'tis Sixty Years Since* (Ibid). Scott introduced his story of the 1745 Jacobean uprising, by explaining that the not-too-distant past could conjure feelings of nostalgia, without the loss of recognition brought by older and more exotic settings. Documents kept in Scott's archive of correspondence at the National Library of Scotland (The Millgate Union Catalogue) indicate that he too was a recipient of the Great Telescope letter campaign. Scott acted as president of the Royal Society of Edinburgh from 1820-1832, so the appeals by Fleming to familiarity, sentiments, and ambition, through invocations of the Scottish Enlightenment, Romantic science and local participation likely found their targets in Sir Walter's crowd. Moreover, Maclaurin had founded the Royal Society (as the Edinburgh Society for Improving Arts and Sciences) and it was his part in the 1745 defence of Edinburgh that interrupted the plan he devised with other founding members of the RSE (including James Short and their patron, the Earl of Morton) to build the first astronomical observatory in the city.

Steven Shapin argues that audiences were essential to the support of non-medical sciences in the eighteenth and early nineteenth centuries. Whereas medicine had achieved the critical mass to form a professional community in Edinburgh by the 1730s, other sciences lacked substantial numbers of experts to constitute a professional peer group ("The Audience for Science" 98). This was largely due to Town Council's focus on medical studies as a strategy to enhance university enrolment and bring student money to the city, alongside its policies of hiring only one professor per scientific topic and paying little for research and equipment. Thus, when Alexander Monro primus became ill in 1737 and could no longer lead the likewise ailing Medical Society, Colin Maclaurin transformed it from a society of medical specialists into the Philosophical Society of Edinburgh (or the Society for Improving Arts and Sciences and particularly Natural Knowledge), including in its forty-five person membership, fifteen "Gentlemen who do not make Philosophy or Physick their particular Profession" (Ibid 99). Maclaurin and his colleagues well understood the advantages of elite patronage; societies could

create reciprocal relationships by giving their wealthy, non-scientific members status-enhancing cultural capital through association. For these relationships to succeed, scientists needed to adopt the following strategies: 1) appealing to the interests of the most powerful members of their audience; 2) turning science into a pleasurable social activity; 3) drawing connections between science and general culture; and 4) communicating information using familiar pedagogical styles, namely from humanistic and philosophical discourse (Ibid 166).

While numerous scientific societies developed in different places across Britain, each had audiences with uniquely local characters. For example, from 1799 to 1803 the Manchester Literary and Philosophical Society (founded in 1781) had twenty-six members with half being merchants and manufacturers, and only one listed as a gentleman (Clark 227). The Manchester elite preferred experimental chemistry and physics to botany or natural history, since the former were more relevant to local industry (Shapin "The Audience" 109). However, as Shapin explains:

> The Edinburgh commercial classes were as yet insignificant and politically impotent; local medical men were numerous, but relatively poor. There was no real alternative to seeking cultural patronage and approval among the gentry and aristocrats (Ibid 110).

Landed gentry and their relations, the great lawyers, formed the chief supporters of non-medical science in Edinburgh and their "overarching concern—the 'improvement' of the Scottish nation" was both cultural (to be more like the English aristocracy) and agricultural (since land reform had turned feudal clan chiefs into landowners) (Ibid 101). Wanting to increase profits from farming and mineral rights, which could also help improve their social standing, Edinburgh elites counted agriculture, horticulture, geology and meteorology among their primary scientific interests. Other sciences would have needed to justify their local utility to obtain substantial patronage. In a 1741 bid to raise funds for an observatory, Maclaurin explained that astronomy could help navigation and trade, and be useful for "ascertaining the geography of this Country even of the distant parts," (Bryden "The Edinburgh Observatory 451) while seventy years later Sir George Mackenzie attempting the same, called astronomy "the most noble, as well as the most useful of the sciences" (Ibid 445). Shapin notes the "desperate time" experienced by Mackenzie's Astronomical Institution to finance the city observatory (the

future Royal Observatory) in 1818 ("The Audience for Science" 113). Except for the Earl of Morton (who initiated contributions to Maclaurin's observatory fund and for a time, championed James Short), it seems that few among the Edinburgh elite cared much for planets, satellites and suns. Yet in their efforts to raise funds for an astronomical observatory, professors and enthusiasts promoted astronomy to the non-scientific, and introduced the notion of a popular observatory, perhaps inadvertently preparing ground for Maria Short.

The affiliation of women with scientific progress may have not seemed unusual for potential supporters of Maria Short. Although the ideology of separate spheres for men and women became what Stena Nenadic characterises as the "central and unifying aspect of middle class values" that emerged in the nineteenth century among urban Scots (121), British women participated in fields that included instrument making, mathematics, and astronomy. With little access to a university education or other credentials required to work in public domains, Londa Scheibinger observes that some women pursued scientific activities that were home-based, though often as increasingly "invisible assistants" to male relatives *(*98-99). Noble and elite women could gain limited access to scientific knowledge by offering public recognition and patronage in exchange for private instruction by scientific men of lesser rank, and following craft traditions, which valued practical skills including calculation, illustration and observation over "book learning," women of humbler birth participated in household workshops as "daughters and apprentices, wives assisting their husbands, independent artisans, or widows who inherited the family business" (Ibid 67).

Astronomical research in particular saw significant participation from women that dated from the seventeenth century. Between 1650 and 1710, 14% of German astronomers were women, while outside Germany, Margaret Flamsteed (1670-1739) and Elizabeth Helvius (1643-1697), worked alongside their spouses and managed their posthumous publications.[82] In Maria Short's time, two women were being celebrated for their contributions to British astronomy. Comet-finder Caroline Herschel (1750-1848), who had been groomed by her brother William Herschel first as an opera singer and then as an assistant astronomer, became the first woman to publish in the Royal Society's Philosophical Transactions, even though she could not be a

society member (Schiebinger 262-263; Mary Brück 24-44). Scottish writer Mary Somerville (1780-1872), Herschel's fellow honorary (but not official) member of the Royal Astronomical Society, was dubbed the "Queen of Science," having taken advantage of early widowhood and a supportive second spouse to pursue research in mathematics and astronomy (Mary Brück 67-79).

Regardless of their accomplishments, gender remained codified and certain spaces would have been barred to women, as well as to the working classes. While perhaps not appearing as submissive or self-effacing as Herschel, Somerville for example took care to publicly conform to feminine ideals "so as not to appear transgressive" (Yeo 158). As a socialite in Edinburgh, her talent and charm drew the notice and encouragement of its local intellectuals including future mathematics professor and Maria Short naysayer William Wallace (Maddrell 40). After their move to London in 1816, Somerville and her husband would participate in the metropolitan culture of "polite science," which saw informal conversations among men and women mix sociality into a burgeoning intellectual scene of diverse scientific activities that also included publishing and more formal discourse (Secord "Scientific Conversation" 31-34). The Somervilles circulated within a relatively narrow circle that enjoyed connections reinforced by memberships within scientific societies, but the absence of living male relatives would augment the implicit disadvantages of gender experienced by Maria Short, and even more so in the Scottish context.

Whereas enlightened salon cultures of Paris and London had seen women adopt leading positions, and mid-eighteenth-century England enjoyed a vibrant circle of Bluestockings, Rosalind Carr argues that in the same period, "Scottish women were totally excluded from the intellectual Societies of the literati" (8). Historians during the Scottish Enlightenment tied human history to natural history—classifying and ordering different cultures into a "diachronic and progressive sequence of stages" (Sebastiani 133). Despite an active belief in this *stadial theory,* which upheld women as a civilizing force that supported the progress of men and considered the condition of women as a measure of a civilization's progress, Scottish associational culture limited the public participation of women to primarily social spaces such as theatres, concerts and assemblies.[83] Enlightenment Scots deemed female intellect inferior

and considered any undue influence from women a threat to masculinity (Sebastiani 143-150). Therefore, it is also possible that Thomas Fleming, duty bound only to helping Maria attain a liveable pension, and as someone who likely ascribed to dominant ideologies of gender, held little interest in seeing her shed the persona of helplessness and passivity that he projected onto her and that she, for a time, apparently accepted as a willing subject. The observatory campaign would see Maria adopt a more active role that saw her and her activities released from more supposedly appropriate feminine spaces. Instead of remaining, as Fleming characterized her, a "helpless and unprotected female" in need of philanthropy, Short would become a business owner herself. How did this new role affect her relationship with Fleming? Did willful ambition offend his notion of femininity, or was he deterred by the spectre of fraud that with Short's Observatory emerged yet again?

Honest Man and Thief

Although the print campaign to sell the Great Telescope did not reach Walter Scott until May 1831, doubts about its viability and the pursuit of alternative strategies had existed for well over a year. In a handwritten note to John Tait at Dalkeith House dated March 24, 1830, Fleming reported that although they had signed the "most respectable names in Edinburgh, the Lords of Session, Professors of the University and other official characters," the "very unsuccessful" and slow progress of the campaign gave cause for concern (NAS GD244/588/16). Characterizing a petition for a Royal Pension as a "more likely proceeding," he requested that Tait's employer, the Duke of Buccleuch, convey their proposal in person to the king. However, that the package that Fleming and Maria assembled remains among the duke's papers at the National Archives in Edinburgh suggests that the delivery was never made.

Maria soon pursued another scheme, this time with little evidence of Fleming's participation or the docile and deserving female of the subscription campaign. The earliest inkling of Short's Observatory and the return of the voice that originally challenged Town Council in 1827 and 1828 can be read in a letter sent by Maria from Fleming's address at 31 South Bridge to the Scottish Society of the Arts on April 12, 1831 (Appendix C). In it, she attributes the failure of the subscription campaign to the poor condition of the telescope and recounts how she has sent it

to London for repair at her own expense "in order to render it an object of interest & attraction to the Public." Then requesting the "support and patronage" of the "Gentlemen of the Society of Arts," Maria outlines a scheme to publicly exhibit the instrument, using admission fees "not to exceed seven shillings" to offset the cost of repairs. In the postscript she adds,

> Any Gentlemen, therefore, who may generously wish to become a subscriber is requested merely to add his name to the List as no money is required until the Telescope is about making its appearance, which will not take place until a sufficient number of subscribers is procured.

Two names are missing from the lists of over two hundred supporters that a few years later appeared on printed pamphlets for Short's Observatory (figures 12b and 13c). They are Thomas Fleming and William Liddell, associates of Maria Short between 1827 and 1834. Let's call them *the honest man* and *the thief* after designations given to them by the British press on one hand, and its judiciary, on the other. Representing truth and falsehood, with one in light (*splendidus*) and the other in shadow (*obscura*), they parallel two sides of Maria Short, and the ambiguities that she and her projects represent.

The honest man is Fleming, the shawl manufacturer who acted as Maria's most visible supporter from the time of her first appearance in Edinburgh in 1827. Although he penned letters of support to Town Council, Sir Walter Scott and the Duke of Buccluech, took a leading role in the lottery sales campaign, and lent his business address for Short's correspondence, it seems as though Thomas Fleming ended his involvement in the early 1830s and had nothing to do with Short's Observatory although, according to his obituary (*The Scotsman*, 5 January 1850), he remained in Edinburgh until his death in 1850. When Maria Short became embroiled in public controversies during the 1830s and 1840s, the man who originally campaigned for her in the late 1820s seems to have taken no part. Perhaps, the maintenance of Fleming's integrity, posthumously celebrated in the press, required an end to their associations. Like others who picked up *The Scotsman* newspaper's account of the "PRAISEWORTHY CONDUCT," of Fleming and his wife, Charles Dickens announced "FOUND, TWO HONEST PERSONS" in the May 1859 edition of his weekly journal *All the Year Round.* Dickens and other journalists praised "the late

Thomas Fleming, shawl manufacturer in Edinburgh" and his widow, for paying off creditors long after the 1825-6 financial crisis that had caused so many others to declare bankruptcy.[84] Fleming would spend decades in pursuit of repayment. And as the journalists noted, Fleming met his financial commitments from beyond the grave. However, Fleming's name appears only once among the materials I uncovered relating to Maria Short that date past 1831. The last record that connects Fleming to Maria can be found with the inscription of his name and address in a collection of court papers, which also contains promotional material for Maria's observatory project that circulated in 1834 (figures 12b and 12b), but more specifically concern the crimes of a mysterious Edinburgh optician named William Liddell Junior, the thief (NAS AD 14/35/359).

The front page of a printed court paper from 1833 that outlines charges against Liddell of theft and unlawful entry bears the inscription "Mr. Fleming, 31 South Bridge." With none of the bundle's contents otherwise referring to him, what could the presence of the shawl manufacturer's name and address signify? Might it indicate that Fleming once requested and read the papers inside? In his 1830 letter to the Dalkeith House, Fleming refers to Maria as "a deserving female who has been accustomed to moving in the *finest society*" (NAS GD224/588/7, emphasis added). If Fleming did not already know about Liddell, perhaps he investigated the accused thief out of concern for, or suspicion of, the woman he had defended. Fleming may have seen the same newspaper report that I read almost two centuries later, which lead me to the papers concerning Liddell's trial, as well as the pamphlet for Short's Observatory within them. Under the heading "Imposter," *The Scotsman* reported in 1834 that

> A young man, named Liddell, was on Monday brought before the Police Court, charged with falsehood, fraud, willful imposition in so far as he waited upon certain gentlemen in this city and procured from them sums of money under the false pretence that he was authorized by Miss Short to collect subscriptions to her proposed exhibitions of Optical Instruments on the Calton Hill (20 August 1834).

With the trial for that crime occurring the following year, Fleming would have found in 1834, only the record relating to Liddell's previous offence—the trial papers that bear his name and address. The document, dated December 1833, charges that, in November of that year, Liddell did "wickedly and feloniously steal, and theftuously away take" gold and silver pencil cases

from a stationer shop on South Bridge, as well as a set of scientific instruments, including some owned by the City, from the university rooms of the professor of mathematics that Liddell had entered by using a forged or stolen key. The document outlines the case against Liddell, specifying a pawn ticket as evidence and naming several witnesses for the prosecution and while the outcome of the trial is unrecorded, the locations of his crimes are noteworthy. That Liddell stole items from the rooms of one of Maria's adversaries, William Wallace, could be explained by Liddell's professional knowledge. As an optician, he would have understood the value of optical instruments and who was most likely to keep some. However, that his first victim, Daniel Rental Sutherland, worked at 95 South Bridge is a curious coincidence given that it was only steps away from Fleming's Warehouse at number 31.[85] Was Liddell in the area because of Fleming? And was Maria Short the link between them? Was Fleming aware of his neighbour's robbery? Perhaps Liddell selected his marks both by happenstance and by their connection to Maria.

The association between the alleged impostors (Liddell and Short) was more proximate than the newspaper report suggests. Papers in the bundle indicate that at Liddell's trial for his second crime, held before the Lord Advocate Sir William Rae in January 1835, Maria testified that she had lodged with the accused and his father, William Liddell senior, also an optician, while she was developing the observatory campaign.[86] However, she did not specify, in her witness statement, how long she lived at the Liddells nor how implicated they were in her decision to exhibit. Yet recall that Maria's letter to the Scottish Society of the Arts indicates that she began thinking about exhibition as early as 1831. According to its postscript, the notion of charging admission to show the Great Telescope was a scheme that Maria had been "advised to adopt". Was it one of the Liddells who made the suggestion? Maria testified that the accused could have learned about her project from the copies of her prospectus and subscriber lists kept in the Liddell house and shop, and moreover admitted to having hired Liddell junior to write to Lord Brougham and Sir John Campbell requesting their sponsorship. She insisted however that she had never authorized him to make collections on her behalf.

Alongside Maria's testimony, Liddell's 1835 trial documents record the witness statements of four of his victims and their servants, as well as members of the eight-person committee apparently assembled to direct Short's Observatory. To convince his prey to pay, Liddell used copies of the observatory prospectus, a book of fake receipts and a certificate of authorization with the forged signatures of committee members William Home, a Writer of the Signet, Advocate John Shank More and Reverend Edward Craig. When a servant of subscriber Dr. Abercrombie recalled that he had already made a contribution, he called on Mr. Home to complain and unveiled Liddell's operation by showing Home the letter forged in his name. Home, like Maria, Shank More and Craig denied signing any receipt or giving any authorization to the young optician to collect on the project's behalf. Liddell destroyed the fraudulent receipt book and letter, but the jury found him guilty and sentenced him to prison for twelve months ("High Court of Justiciary" *The Scotsman* 21 January 1835, 3). With the Bridewell prison also located on Calton Hill, Liddell would have served his term in sight of the very observatory he had tried to defraud. Following Liddell's release, he was arrested again in November 1837 for thefts of a petty and more desperate nature (a coat, a pickled tongue, a jacket, and some shoes) and charges of "habit and repute, and a previous conviction" resulted in Liddell being sentenced to "fourteen years' transportation" ("High Court of Justiciary" *The Scotsman* 5 January 1835, 3).

Where there is no indication that he and Maria Short ever met again, what shadow does the criminal activity of William Liddell junior cast? Is it possible that the two colluded or influenced one another? At Liddell's trial, Shank More claimed that he was unaware of his involvement with the popular observatory, having only a vague recollection of "being asked by some Gentleman whom he does not remember to be a member of Short's Committee." His uncertainty raises questions about the commitment of the eight committee members, who supposedly directed Short's Observatory and the two hundred supporters identified by the "List of some of the Names of those what have already granted their patronage to the projected exhibition" appended to Maria's printed prospectuses (figures 12b and 13c). The 1836 "Short's Popular Observatory" pamphlet located at the University of Edinburgh names nine committee members, including Shank More, Craig, and Home, and two hundred and twenty some patrons.

Each beginning with the Duke of Buccleuch and Lady Anne Scott, the lists include additional nobility as well as titled officers of the court, university professors, fellows of the Royal Society and the Royal Colleges of Surgeons and Physicians, members of the clergy, naval officers and numerous lawyers. The Solicitor General and numerous proprietors of the Astronomical Institution also appear on Short's list. Given that Cockburn and the Astronomical Institution were actively opposing the building of Short's Observatory at the time of Liddell's arrest, there begs the question of whether some other deceit was at play.[87]

Instruments and Magic

In her affiliation with the Liddells and her dealings with Tulley, the instrument makers in London who repaired the Great Telescope, it is possible that Maria learned something of the Short family business of optical instrument-making—a field where the participation of women was not that unusual. Having researched women in the scientific instrument trade from the late eighteenth to nineteenth centuries through the study of street directories and census occupation listings, Alison Morrison-Low uncovered numerous British women, including opticians and telescope-makers, in London and Edinburgh—estimating that the numerically small and geographically limited instrument trade had a workforce of thousands with female participants numbering in the hundreds ("Women in the Nineteenth-Century Scientific Instrument Trade"). It is likely that many women identified by her research were widows, and Morrison-Low acknowledges that the nature of their work and the duration of their ownership cannot be determined. Some may have been in the process of closing or preparing to transfer the business to male heirs. While an absence of records obliged the exclusion of women employees from the study, Morrison-Low's research points to a trade characterized by small family businesses that would have included widows, wives, sisters, and daughters. What Maria could not pick up in childhood from her father or uncle since both were deceased, she may have learned from her mother, older sisters or even from her father's first family (the Douglases) or his other associates had contact continued. It is also possible that her acquaintance with the trade deepened through her dealings with Tulley and through her stay with the Liddells. Although Maria could access the flourishing culture of popular science, which

included cheap publishing, as well as presentations by itinerant lecturers, access to the Liddell shop and Tulley catalogues would supply a greater understanding of the affordances, availability, and pricing of optical instruments that could assist the drafting of her popular observatory proposal.

Shops and tradespeople bridged whatever divide existed between optical devices for amusement and everyday application, and those used for scientific research. Instrument catalogues from the late eighteenth to the nineteenth century demonstrate that the same businesses that sold devices to natural philosophers also produced the equipment that populated venues like Short's Observatory. For example, the 1836 subscription pamphlet for Short's Observatory identifies Dollond of London as the maker of one of its achromatic refracting telescopes, its orrery, and "one of the best and finest" camera obscuras then "daily expected" (figure 13). Stuart Talbot describes the Dollonds as the "world's most famous Practical Opticians and wealthiest Telescope-Makers," in an analysis of two of their catalogues. By comparing price lists from 1780 and 1818, Talbot concludes that competition between instrument makers kept prices and inventories low, and the variety of products they offered high. He writes,

> The extraordinary variety of Optical Products offered in this '1818 Catalogue Trade Handbill' illustrates their remarkable scientific range and proves that Dollonds led the world trading in scientific instruments from the front, selling to many governments, armies and navies, universities and observatories, navigators and surveyors, lecturers and researches, and it also combined the Dollonds' detailed 'Spectacle and Opera-glasses price-listing' which interested the lay-public directly (Ibid).

The 1818 catalogue sheet reproduced in Talbot's article also lists several exhibition devices under the heading "Other Optical Instruments," which alongside camera obscuras includes "Solar Microscopes, Magick Lanthorns, Glass Sliders with painted figures, Optical Machines for viewing Perspective pictures," etc., (37). My surveys of other nineteenth-century instrument catalogues by London makers such as Troughton and Simms (n.d.), G. Dollond (1831), Watkins and Hill (1832), W & S Jones (1837) and Newton and Co. (1851) indicate that they too offered optical instruments for scientific, personal and spectacular uses.[88] The technical and material aspects of instrument-making that facilitated this market-driven strategy is explained in the

introduction to *The Heavens on Earth*, a collection that explores the cultural history of nineteenth-century observatories. Its editors David Aubin, Charlotte Bigg and H. Otto Sibum note:

> All optical devices were characterized by shared hardware (screws, diving circle, prisms, lenses, etc.) and shared methods of producing and interpreting evidence, all of which were important concerns for the observatory. These devices have mostly been considered in isolation from each other, obscuring their common origin (21).

Connections between instruments, makers, and popular applications moreover emerged from a centuries-long tradition. After Robert Boyle (1627-1691) and Robert Hooke (1635-1703) demonstrated portable cameras obscura to fellows of the Royal Society (Hammond 20, 22), constant improvements and variations by seventeenth and eighteenth-century instrument-makers resulted in mobile devices for use in demonstration, sightseeing, and as drawing aids for *in situ* studies. While others disguised as books or goblets promised their possessors the ability to surreptitiously spy on those around them, discourses of Enlightenment science identified instruments more with revelation than deception.[89]

A popularizer of scientific knowledge and optical instruments, Benjamin Martin (1704-1782) published extensively, and before opening his London-based business in 1756, operated as an itinerant lecturer for fifteen years. Like other eighteenth-century popular lecturers, such as Desaguliers (1683-1744), Gravesande (1688-1742), and Abbé Nollet (1700-1770), Martin would extend and diffuse the benefits of what Robert Hooke had called “ocular demonstration” as an epistemic form to a broader audience throughout the UK and Europe (Hankins and Silverman 52). Describing the value of the camera obscura for explaining optical science, Martin wrote

> But the optician himself is greatly interested therein. By this grand experiment he demonstrates ocularly the principles of his art. For by admitting the sun-beams thro’ the hole of the window-shut into the darkened chamber, he can actually shew the focus of parallel rays by reflection from concave mirrors (qtd in Hankins and Silverman 53).

As an instrument maker, Martin focussed on the production of cheap and simple instruments for the sale to, and education of, a less elite clientele (Milburn 101). However, his next door neighbour on Fleet Street, the optician John Cuff (1708-1772) was, like Maria’s uncle James

Short, a specialist who commanded high prices from a wealthier and more expert customer base. Although Cuff specialized in microscopes, he nevertheless published a promotional pamphlet in 1747, which featured the poem, "Verses Occasion'd by the Sight of a Chamera Obscura" (republished in Schwarz "An Eighteenth-Century English Poem"). Possibly written by Cuff himself and of dubious quality ("How the Clown stares! Smit with surprise and love/To see inverted pretty Milk-Maid move/With Pail beneath her head, and feet above"), its seventeen verses explore and explain the spectacular workings of the camera obscura, beginning with a footnoted discussion of its origins, and its mistaken and potentially dangerous associations with magic.

> Say, rare Machine, who taught thee to design?
> And mimic Nature with such Skill divine?
> The Miracles of whole creative Glass,
> Struck with Amaze, the superstitious Class,
> Of Fools, in *Bacon's Days, and did for Witchcraft pass;
> Productions Strange ! Weak Reason did transcend;
> And all admired, but few could comprehend ;
> The Cause conceal'd ; th'Effect Men plain perceive;
> Compell'd by Sight that Myst'ries to believe.
>
> *Friar Bacon, who for his Skill in Optics, and other Arts, was tried for a conjurer.

Associations with deception and suspicious regards had long troubled optical instruments and their makers. Concerns about Short's popular observatory, which will be discussed in further detail in the following chapter, may have also tapped anxieties carried from previous centuries regarding scientific truth and trickery. Barbara Maria Stafford identifies the mistrust of display in the age of Enlightenment as a form of Orientalism, where the "artful science of specious demonstrations supposedly preyed on the stupidity of enslaved races fed daily doses of illusion" (8). Protestants alongside members of the Republic of Letters, would condemn practices of the Roman Catholic Church, and significantly the Jesuits, long associated with natural magic as an "Asiatic" practice (Ibid 1-22). Such concerns are present in David Brewster's 1832 *Letters on Natural Magic, addressed to Sir Walter Scott*. Although Brewster considered it a subject of "deep interest" ("Letter 1" 7) he also identified it with the "superstitions of ancient times,—of the means by which they [those in power] maintained their influence over the

human mind" (8). He moreover traced deceptions accomplished with concave mirrors to "ancient miracles" performed by "monarchs and priests of ancient times" ("Letter IV" 48) to overcome "ignorant minds" (55), and the continuation of the practice as "modern necromancy", citing the prayers of one Theodore Santabaren, a pontiff that Brewster describes as an "ecclesiastical conjuror" (56-57). Thomas L. Hankins and Robert J. Silverman explain that "The natural magician revelled in his ability to trick the senses of his audience and to conceal the causes of the effects he produced, and he did it with instruments" (4). They identify natural magic as the forerunner to "philosophical instruments" and claim that instead of disappearing, the tradition "was merely subsumed under new categories such as entertainment, technology and natural science" (Ibid). However, the intermingling of categories meant some ambiguity—such that instrument makers and demonstrators might not always be free from suspicion. During his career as an itinerant lecturer, optical instrument-maker Benjamin Martin recalled,

> And to say the truth, there are many places where I have been, so barbarously ignorant, they have taken me for a magician; yea, some have threatened my life, for raising storms and hurricanes, nor could I shew my face in some towns, but in company of clergy or gentry, who were of the course…such likewise was the case of our celebrated showman Dr Dessaguliers [sic], as I have been told. And is it not a deplorable case, that philosophy should thus be disgraced by macarel-women, wool-combers, and knights-errant! (qtd in Milburn 41).

Did the crimes of William Liddell raise the spectre of deception and unruliness that already surrounded instruments and more specifically, the Shorts and their projects? Being willful subjects, neither Thomas Short nor Jacobina Downie could claim to have well-respected or honest reputations in their time. Recall that Maclaurin referred to Thomas as the "completest Villain" (Mills 101) and Jacobina testified to a pretend marriage to the convict McFadzen, for the "gratification of an amorous intrigue." Professor William Wallace had already implied that Maria was an impostor and evidence to support her identity was weak. Perhaps Maria's proximity to a convicted fraud and transported criminal, finally resulted in the loss of Fleming's good opinion. Yet another stain on the willing image of gentility and enlightenment that he had drawn may have effaced whatever interest he had in Maria or her observatory scheme. Or perhaps Maria had already decided that she could do better without him, and for that matter, threw aside the Liddells as well.

III. Inverting the View on Calton Hill (1834-1869)

The legacy of Short's Observatory

> SHORT'S LARGE GREGORIAN EQUATORIAL REFLECTING TELESCOPE, having been returned from London by Mr. Tulley, to whom it was sent to be repaired, the Magistrates have granted a site on the Calton Hill upon which to erect a structure for its reception and exhibition. And in addition to this splendid instrument, Miss Short, the proprietrix, (only surviving daughter of the late Thomas Short, original Founder of the Edinburgh Observatory,) in order to render the Exhibition still more deserving of Public attention purposes adding a variety of other interesting Optical Instruments, viz. a large CAMERA OBSCURA; a COMPOUND MICROSCOPE, and a SOLAR MICROSCOPE of great power and effect, with apparatus for applying Hydro-oxygen gas; also, a PHANTASMAGORIA LANTERN, with Sliders illustrative of objects in Astronomy, Natural History, etc. etc. These will be exhibited by a person who will make Explanatory Observations, for the instruction of juvenile visitors (*Exhibition of Short's Telescope* "Prospectus" [figure 12a] 1834).

In 1835, Maria Short opened her first popular observatory on Edinburgh's Calton Hill with the express purpose of showcasing her Great Telescope. Although she supplemented its exhibition with numerous optical scientific instruments, it is arguably her walk-in cameras obscura that would become most associated with her projects. From the outset, the projection apparatuses that overlooked Edinburgh and the daytime movements of its citizens, eclipsed Short's other exhibits, including the twelve-foot reflecting telescope that had been her original prize. With the promise of Short's Observatory, a number of inversions took place. Her splendid camera obscura turned her great telescope upside down, metaphorically, technically, and functionally. A shareable projected image supplanted views seen through the eyepiece of a personal instrument—a transformation that mirrored the publicizing of equipment that had previously relied on private ownership for access.

Before its construction even began and a full two years before its installation, opponents of Short's Observatory moreover vilified in particular her proposed camera obscura and the subsequent offences they supposed it to herald. Alongside others campaigning against Short's scheme, Solicitor-General Lord Henry Cockburn published his letter to Town Council in a local newspaper, warning,

> I need not explain to any person of intelligence, the effect of this profanation of that sacred ground. The proposed structure in itself will be abominable. It is intended for a Camera Obscura, and for other such exhibitions, and therefore is naturally proposed to be placed on that

> eminence which commands the finest prospect, and which is most glaringly visible from the greatest number of the most important points in Edinburgh. It will no sooner be raised and fairly seen, then there will be one unanimous and most just cry of indignation from every quarter. But it is not this individual structure that is to be looked to. If the example be once set, nobody can fail to see that the Calton Hill will henceforth become the receptacle of Panoramas, Caravans of wild beasts, and all manner of public show boxes. The progress is inevitable. (*The Scotsman* 23 July 1834).

Now, more than a one hundred and eighty-years later and at the Castlehill location of her second venture, *Edinburgh's Camera Obscura and World of Illusions* headlines a descendent of Short's original instrument right within its business name.[90] Nevertheless, even in the absence of such overt promotion, a splendid walk-in device consistently and continuously overshadowed the other attractions that Short and her successors offered at the site. After the 1869 deaths of Short and her husband Robert Henderson, their trustees rented the building to optician and instrument-seller William Dickson Hart. By the beginning of 1870, Hart had renovated and reopened the hands-on exhibition with re-installations of its large telescopes and "a number of beautiful working models of machinery […] wrought by electricity," including a model railway, various sorts of engines, galvanic devices and working telegraphs ("New Year's Day" *The Scotsman* 3 Jan 1870). In 1872, a notice that proclaimed Short's Observatory as the "MOST ATTRACTIVE SIGHT in Edinburgh" announced the recent installation of a new camera obscura "unequaled in this Country" (*The Scotsman*, 10 August 1872). Reporting on the New Year's activities of 1876, an observer for *The Scotsman* newspaper remarked,

> A variety of models moved by electricity were viewed with lively interest; but of course the great attraction was the camera obscura, the room on the top of the tower in which it is situated being crowded during the greater part of the day ("New Year Holiday in Edinburgh" 3 January 1876.)

William Dickson Hart died aged 67 in Short's Observatory on June 22, 1893 (see *Dundee Evening Telegraph,* 24 June 1893). By that time, the prominent urban planner and sociologist Patrick Geddes had already purchased the building from its trustees at auction, and soon after began transforming it into *Outlook Tower*. The popularity of the camera under Geddes's governance and the 1947 upgrade by the Outlook Tower Association demonstrate the enduring significance of the device. Though Geddes enjoyed international recognition as a champion of the study and

improvement of urban life, his obituary in the *Edinburgh Evening News* included a special mention of his Castlehill rooftop device as “a source of interest and delight to citizens and visitors” (18 April 1932, 2). In other words, although Maria Short would slip from memory, the fascination with her splendid camera obscura persisted. Ironically, surviving publicity suggests that the optician’s daughter herself rarely promoted the device until the final years of the venue being under her watch, which after decades of fluctuating fortune waned with her dotage.

From the preliminary 1830s subscription campaign for the building of Short’s Observatory on Calton Hill to the mid-century notices of its relocation on Castlehill, Maria Short in her prime acted as an aggressive impresario. As subsequently explained, Town Council Minutes record attempts to curb the promotional signage and unwelcome solicitations employed by Maria throughout the 1840s. Alleged refusals to temper her energetic marketing campaigns eventually gave the City cause for her 1850 eviction from Calton Hill. Following the demolition of her first venue, Maria bought and renovated the building at the northeast corner of Castlehill and Ramsay Lane. Little cowed, she troubled local officials again by refitting her new property with a tower that surpassed the municipal building limitations for height and size, thereby ensuring that its rooftop camera obscura could command the city’s Royal Mile with a fine panoramic view that includes castle grounds, Princess Street, Calton Hill, Old Town and beyond (24 May 1854, ECA TC Minutes [262]). Its cupola remains a prominent feature at the top of the High Street, readily seen from numerous vantages and traces of the original signage can still be made out on the tower’s outer walls.

Archived examples of Short’s printed prospectuses and pamphlets, as well as advertisements in the local press, document a series of promotions spanning the four decades that Maria Short managed her sites. Numerous notices mention a walk-in device, alongside other attractions, yet only in the 1860s does the camera obscura receive special attention in printed promotions of Short’s Observatory. Then, newspaper advertisements began to solicit “Strangers visiting Edinburgh,” promoting the location as “the only point from which a complete View of the City can be obtained” and remarking that it could be “shown with pictorial effect by a splendid

Camera Obscura".[91] Whereas Short's earlier campaigns often listed a wide range of instruments, her more focused notices tended to promote telescopic viewings of planets and astronomical events, or new and itinerant exhibitions of recent technologies, such as the electric telegraph, limelight and the "chromatrope'" (the projecting kaleidoscope patented by David Brewster in 1846).[92] Before 1863, the only notice that highlighted the camera obscura was the one announcing its initial installation in 1836, which read:

> CAMERA OBSCURA
> THE SUBSCRIBERS and VISITORS to SHORT'S POPULAR observatory are respectfully informed that in addition to the extensive and valuable collection of Instruments contained in this Institution, a SPLENDID CAMERA OBSCURA, by DOLLOND of LONDON, has been fitted up, and is now ready for exhibition. This Instrument, which is of 12 feet focal length, and improved construction, is admirably adapted for displaying the magnificent scenery around the Calton Hill (*The Scotsman,* 16 July 1836).

Why did Short print so little publicity for her camera obscura? Was the device so popular that it required little promotion? Or was Short reluctant to highlight its presence, especially after its opposition by naysayers who in 1834 tried to block her first venue? And if Short preferred to present her exhibition as a scientific display, what epistemological value did she claim for her room-size devices? While definitive answers may not be possible, having better understandings of the context of Short's venues and the applications of cameras obscura in the nineteenth century can help explain the shift in focus from great telescope to splendid camera obscura.

A one-page manuscript addressed to the "Subscribers of the Observatory" kept in the Edinburgh City Archives is probably connected to Miss Short's original application to Town Council for the use of land on Calton Hill. Its date, location and owner are unspecified and the handwriting appears to match neither Maria nor Fleming, however the text of the "Conditions of Admitance [sic] into and attendance upon the Observatory" makes the association probable (figure 8, ECA D0105R). It opens with a price structure, followed by descriptions of what phenomena could be seen using its "Great Telescope," such as "the eclipses of the sun and moon, solar spots through the day and the mountainous appearance of the surface of the moon by night" (Ibid). The inclusion of the "new Planets Georgium Sidus, Pallas and Ceres" among the celestial bodies on display, dates the document to the first half of the nineteenth

century, between the 1802 discovery of Pallas and its mid-century reclassification as an asteroid. Therefore, the reference to the instrument coupled with relatively low admission fees identifies the project as likely that of Maria Short. Although the one-sheet focuses on astronomical observation, it also mentions the telescope's ability to view terrestrial bodies in good weather, such as "Distant Towns Villas, Shipping on the Firth of Forth" and concludes with a mention of a "Camera Obscura and Solar Microscope" already on order for exhibition. With admission priced at 1 guinea for an annual subscription (including the admittance of two ladies and their children), 12 shillings for a half year (including one lady), 8 shillings for a quarter year, and 1 shilling per ticket—rates were lower and more flexible than the Astronomical Institution. While the society admitted its members for a 25-guinea lifetime share, or an annual subscription rate of 2 guineas per year with 5 guineas up front, Marie arguably targeted a less elite audience that included visitors to the city who might not have local society connections.

Maria built and equipped her popular observatory through another subscription campaign with flyers that describe the project in increasing detail with increasing numbers of spectacular instruments. While the relative simplicity of Maria's originally proposed exhibition might have justified its modest fees, she maintained low admission prices even though her handouts and newspaper advertisements detail a growing accumulation of instruments and displays. The 1834 subscription pamphlet stored among Liddell's trial papers announces the approval by Town Council of a site on Calton Hill, explaining that "Miss Short, the proprietrix…in order to render the Exhibition more deserving of Public attention, purposes adding a variety of other optical instruments" (figures 12a and 12b). Alongside the exhibition of "Short's large equatorial reflecting telescope" recently repaired by London instrument maker Charles Tulley, it lists two more eyepiece-based devices: a new and easier to use achromatic telescope, and a compound microscope. The prospectus also lists three projecting apparatuses: a camera obscura, a solar microscope "of great power and effect", and a phantasmagoria lantern "with slides illustrative of Astronomy, Natural History, etc.," Though the projected magnifications of a solar microscope had traditionally been illuminated by sunlight, just as the image of a camera obscura required no artificial source of light, an allusion to an "apparatus for applying Hydro-oxygen Gas" indicates Maria's desire to exhibit limelight, then a new technology. Though later documents

suggest that her solar microscope operated by natural light alone, the 1836 pamphlet now kept in the University of Edinburgh Special Collection (figures 13a, 13b and 13c), lists a wider array of devices than earlier described, including a magic lantern or "Astronomical Demonstrator" and a solar microscope to project magnifications from a kit of 300 slides. Along with a compound microscope and 10-foot telescope by Tulley, the brochure boasts a collection that also included a 5-foot refracting telescope, an orrery, a diagonal mirror (or zograscope) and set of landscape prints, a camera obscura ordered from Dollond, as well as a camera lucida, a Phantasmoscope, a set of globes, a model of the Thames Tunnel and a "variety of smaller scientific instruments". Having sought the support of "enlightened" and "public-minded" backers, in a few short years Maria pursued the ambition articulated in her 1834 prospectus that,

> This Exhibition when altogether completed will be found the most extensive of the kind in Europe accessible to the Public; and not less calculated to afford instruction to the curious and intelligent observer, than to produce amusement for the vacant hour.

Public Science, Spectacle & Utility

Distinguishing the popular and the entertaining from the pedagogical and the scientific is no easy feat, for the element of pleasure found in many public lectures and demonstrations did not negate their didactic and edifying value. In their introduction to *Science and Spectacle in the European Enlightenment* (2008), editors Bernadette Bensaude-Vincent and Christine Blondel explain that popular demonstrations helped "legitimize experimental knowledge" through presentations of laboratory science, while visual experience and sensation communicated the wisdom of empiricism (6-7). Furthermore, they contend that spectacles "stimulated the practices of science in various social contexts" and by nature of their repetition, "contributed to the stabilization of knowledge and the advancement of science" (8). Nevertheless, Aileen Fyfe and Bernard Lightman caution, "If *popular* were to be defined against *expertise*, all the transformations of *expertise* over the nineteenth century would make it impossible to attach any consistent meaning to *popular*" (*Science in the Marketplace* 2, original emphases). As she drew support for her projects, Maria Short, like other popularizers in her time, embraced the ambiguities that others, invested in other sorts of advancement, struggled to minimize. Yet the pamphlets for Short's Observatory promote the venue and its instruments by touting their

pedagogical value and technological connection to observatory science. The 1834 subscription pamphlet, presented as an appeal to "enlightened and public-spirited individuals," notes, in an italicized sentence isolated from the rest, *"The utility of such an Establishment, open at all times to the Public, and which is so much wanted here, it is unnecessary to point out."*

The 1836 pamphlet begins with the statement:

> This institution having been opened in May last, and inspected by many hundreds of visitors, including various scientific gentlemen of the first eminence; its object and utility, it may be hoped, are so well known, as to render it unnecessary to explain them.

Introducing a comprehensive list of its instruments, the text explains that they are "calculated to afford both entertainment and knowledge." While acknowledging the diverse practices and purposes of nineteenth-century observatories, Bigg, Aubin and Sibum write,

> The observatory, we argue here, was essential in ensuring the growing social and cultural significance of the mathematical, physical, and cosmological sciences in the nineteenth century. It was simultaneously indispensable in constructing elements of the modern western state and society—among others, European colonial expansion and the emergence of a public enthusiasm about scientific and technological developments (2).

Short's Observatory participated in a flurry of activity. While a fascination with science as an entertaining and useful pastime dated to the previous century, the audience for science expanded with surges in industrialization, urbanization, and an emergent middle class. The burgeoning trade in cheap publishing complemented a scientific popular culture that was rooted in eighteenth-century traditions, such as itinerant demonstrators and lecturers who continued to delight public audiences with spectacular displays. The sales of inexpensive tracts that could provide scientific learning to less educated readers appealed to the reform-minded who sought the improvement of the British lower classes, and the strengthening of British trade and innovation through the education of its workers. A variety of sites for scientific consumption proliferated throughout the century. Before the landmark Great Exhibition at the Crystal Palace in 1851 and the emergence of public science museums, visitors would flock to Short's early contemporaries in London, such as the Adelaide Gallery of Practical Science (1832-1845) and the Royal Polytechnic Institute (1838-1881), which "straddled the divide between

workshop and shop window" (Morus, *Frankenstein's Children* 83). A Short's Observatory handbill advertises that their Chromatope "which produces the most beautiful and diverse Changes ever witnessed" is from the Royal Polytechnic Institution, and so presents further evidence of a correlation between the Calton Hill and London venues. An early catalogue of the Polytechic explained,

> The education of the eye is, undeniably, the most important object in elementary instruction. A child will pass many years before he can be made thoroughly to understand, by *unassisted* description, the cause of motion in a Steam Engine, but a brief acquaintance with the sectional and working models of the Institution will teach him a lesson he can never forget. In like manner, the powers of Galvanism, the properties of Electricity, the mysteries of Chemistry, the laws of Mechanics, the theory of Light, the developments of the Microscope, the wonders of Optics, the beauty of Sculpture, the construction of Ships, with various other matters in Science and Art, are made palpable by exhibition, and thus instruction is rapidly and pleasurable communicated in awakening curiosity, excitement and attention, and by such means leaving behind a valuable and durable impression.
>
> But in offering facilities for obtaining knowledge which Lord Bacon has justly denominated 'power', the Directors of the Polytechnic Institution have not been unmindful of the inducement which a path of flowers opens to its acquisition. (qtd in Weeden 7, original emphasis).

Historians of science and contemporaneous observers frequently remark on the scope and fervent belief in scientific activity in the nineteenth century. For example, one of numerous inexpensive publications by the Society for the Diffusion of Useful Knowledge (1826-48), asserted in its opening remarks,

> The practical uses of any science or branch of knowledge are undoubtedly of the highest importance; […] The mere gratification of curiosity; the knowing more to-day than we knew yesterday; the understanding clearly what before seemed obscure and puzzling; the contemplation of general truths, and the comparing together of different things,—is an agreeable occupation of the mind; and, beside the present enjoyment, elevates the faculties about low pursuits, purifies and refines the passions, and helps our reason to assuage their violence (*Library of Useful Knowledge* 2).

Established by Henry Brougham, who also founded the *Edinburgh Review*, ascended to Lord Chancellor of Britain in 1830, and oversaw the Reform Acts of 1832 and Slavery Abolition Act in 1833, the Society was "mocked as a Whig folly," and parodied in caricatures like "The Pursuit of Knowledge under Difficulties" and "The March of Intellect" (Secord, *Visions of Science* 16-19). One of its conservative critics, *Fraser's Magazine* published essays that "railed against the

utopian impracticality of schemes for universal education…and efforts to promote 'the perfectibility of man by 'pure reason' " (Ibid 229). *Fraser's* also introduced, in serial form*, Sartor Resartus* by Thomas Carlyle, who was especially scornful in regard to the state of science. Carlyle penned the parody in the guise of a scientific treatise on clothing, and published it around the same time as his failed application for the post of the Scottish Astronomer Royal. The satirical but often abstruse novel opens with the following observation by "the Editor", Carlyle's stand-in who remarks,

> Our Theory of Gravitation is as good as perfect: Lagrange, it is well known, has proved that the Planetary System, on this scheme, will endure forever; Laplace, still more cunningly, even guesses that it could not have been made on any other scheme. Whereby, at least, our nautical Logbooks can be better kept; and water-transport of all kinds has grown more commodious. Of Geology and Geognosy we know enough: what with the labours of our Werners and Huttons, what with the ardent genius of their disciples, it has come about that now, to many a Royal Society, the Creation of a World is little more mysterious than the cooking of a dumpling; concerning which last, indeed, there have been minds to whom the question, How the Apples were got in, presented difficulties. Why mention our disquisitions on the Social Contract, on the Standard of Taste, on the Migrations of the Herring? Then, have we not a Doctrine of Rent, a Theory of Value; Philosophies of Language, of History, of Pottery, of Apparitions, of Intoxicating Liquors? Man's whole life and environment have been laid open and elucidated; scarcely a fragment or fibre of his Soul, Body, and Possessions, but has been probed, dissected, distilled, desiccated, and scientifically decomposed: our spiritual Faculties, of which it appears there are not a few, have their Stewarts, Cousins, Royer Collards: every cellular, vascular, muscular Tissue glories in its Lawrences, Majendies, Bichâts (*Sartor Resartus* 1-2).

The Gothic Tower

Sartor Resartus is ambivalent in both its criticism of scientific fervour and romanticizing of scientific pursuits—phenomena in the early nineteenth century that would have driven local interests in astronomy, which Carlyle himself professed. That the conservative critic contacted Lord Jeffrey (a local Whig who participated in many of Brougham's activities) about the position at the Edinburgh Observatory may have also been due to Jeffrey being a founding proprietor of the private Astronomical Institution. The Society constructed and owned the second observatory on Calton Hill, replacing the establishment that Thomas Short founded in 1776 and his grandson James Douglas completed in 1792 ("Proceedings of the Astronomical Institution" in *Scots Magazine*, July 1814, 503). Officially established in May 1812, the Astronomical Institution began with three "Objects" in mind: 1) "a Popular Observatory furnished with those

instruments of astronomy that are of the most general and easy use, and most readily made conducive to either instruction or amusement"; 2) "a Scientific Observatory furnished with the instruments required for the nicest [sic] observations of astronomy […] under the particular inspection of the Professors of Natural Philosophy, Mathematics, and Astronomy, and Practical Astronomy"; and 3) "a Physical Cabinet" of philosophical instruments and books, meant as a kind of lending library for members. Besides reaching an agreement with Town Council for use of the Calton Hill Observatory grounds (set at 5s per annum in perpetuity immediately after the Institution's incorporation) and achieving the removal of the "Powder Magazine" stored on site (which was still in process), a progress report published in July 1814 indicates the deferral of their new Scientific Observatory (eventually founded in 1818), and their focus on the Popular Observatory in the newly renovated Gothic Tower (Ibid 502-503).

Likely the first of its kind in Scotland and one of the earliest in the UK, the splendid camera obscura in the Gothic Tower installed between 1814 and 1815 would have witnessed the transformation of Calton Hill. Eyeing the city and summit, the splendid device could watch over the public works and constructions being made on the hill, including by its own proprietors, the Astronomical Institution. The importance of the camera obscura is evident in the society's first report, which explains its significance as follows:

> Before opening the popular observatory, the Directors were anxious to have a Camera Obscura fitted up.—This they expected to have completed twelve months ago; but they have been disappointed by the person employed in London to make the Speculum and Lens, which have only very lately been received. Mr. Adie is now engaged in making the necessary apparatus for them; and it is expected that all that can be done, till funds be obtained for building the new Observatory, will be finished early in the month of May next (Ibid 502).

The treasury book of the Astronomical Institution indicates that in 1814, London optician Charles Tulley charged £47.17.6 for a camera obscura and telescope, and local opticians (and Institution founders) Miller and Adie, charged £52.11.16 for its mounting.[93] Although likely advanced for its time, the Gothic Tower camera obscura might have soon been surpassed.[94] The 1823 ad for a device owned by Ben Holroyd boasted a 9.5 foot focal length and claimed that its 5 feet 3 inch diameter table was "nearly double that of the Calton Hill" ("Ycleped

Royal," *The Scotsman*, 9 July 1823, 4). Nevertheless, proprietors of the Astronomical Institution kept the same device in the Gothic Tower for decades.

The Astronomical Institution entrusted their camera obscura to Agnes MacArthur, who maintained and displayed it until its dismantling in 1839. A record of her employment begins with a bookkeeping entry in 1816 that indicates semi-annual wages of £2 for Agnes as Keeper of the Camera and £7 49s for her father Peter MacArthur as keeper of the Observatory.[95] The MacArthur family resided alongside the device in the Gothic Tower, with its patriarch acting as the general caretaker for the Observatory and grounds. Minutes from a meeting of the Astronomical Institution held on June 18, 1828 record a request from Agnes that they allow her and her aging mother to remain, given that the youngest MacArthur had assumed her recently deceased father's duties from the time of his illness. Members agreed to maintain their arrangement but "expressed a clear opinion of the advantage of having a man sleep in the Observatory, for the protection of the property of the Institution" (ROE AI.3 239).

In Spring 1830, the Astronomical Institution considered the appointment of a new observatory keeper, following complaints regarding the conduct of the MacArthur women. Upon investigation, the Institution's secretary James Nairne found them guilty of only one charge – the unsightly hanging of their laundry, which he consequently prohibited. Agnes wrote to the Institution once again. Perhaps aware that the absence of a husband or father threatened both their income and housing, she informed her employers of the engagement to her cousin John Paul that predated her father's death, explaining that she had delayed their nuptials out of respect for her employers. After apologizing for not informing the Institution sooner and explaining once again that "my old mother has none to depend on but me," she suggested that Paul replace her father as caretaker after they wed (Ibid 285-287). Not only did the Astronomical Institution agree, they would go on to pay observatory expenses and the couple's salary directly to Agnes, including the £10 that she eventually requested as severance (ROE AI.4 141). Yet the understandings between camera keeper and camera owners remains uncertain. Had Agnes really put off her marriage fearing disapproval from the Institution or did she simply agree to the arrangement knowing that it would enable her and her mother to keep their house

and income? And was it marital status or her connection to the camera obscura that safeguarded her position? In 1839, servants of the newly appointed assistant astronomer, Alexander Wallace, would replace Agnes and John Paul (Ibid). Yet the year that saw the end of Agnes's tenure would also occasion the dismantling of her original charge—the Gothic Tower camera obscura—by the Institution's first full time Observer and Scotland's first Astronomer Royal, Thomas Henderson.[96]

It is possible that the Astronomical Institution had already begun to shift their priorities in 1815, as their first set of laws indicate the "advancement of science" through the establishment of the Scientific Observatory as their primary object ("Laws of the Astronomical Institution of Edinburgh 1815" EU D.S.H.107). In 1811 the keeping of instruments for the education and amusement of the subscribers was the initial impetus for founding the organization, but research became increasingly more important, especially after Henderson's appointment in 1834. The decision made on November 11, 1839 to remove the splendid camera obscura marks a definitive shift at the Edinburgh Observatory that paralleled the emergent professionalization of science (ROE AI.4 [AI Minutes II] 150). Minutes of the Astronomical Institution indicate that in place of the camera obscura turret, Henderson installed an experimental anometer, a meteorological instrument used to measure wind speed—a move that was echoed by his counterpart in Greenwich in 1840, when Airy, the seventh Astronomer Royal for England replaced camera obscura of the fifth (Nevil Maskelyne) with a similar device (Brennan 19).

Some members of the Astronomical Institution probably felt the loss of the Gothic Tower instrument and the other resources kept there for their leisure. Lighthouse engineer Robert Stevenson memorialized the founding and development the organization in letter dated January 19, 1850 that is kept with Institution minutes and treasury books in the archives of the Royal Observatory of Edinburgh.[97] In the letter he explains,

> Our idea was, that we might look forward to a Popular Observatory, which would not interfere with the existing Professorship of Astronomy, but have an establishment […] with the advantage of oral and ocular demonstration in the Science of Astronomy treated after a popular form. The present characteristic and beautiful building was then erected, and with the aid of the Government it was furnished with some of the chief Instruments, but much to my regret, the

> establishment has been exclusively limited to the purposes of a Scientific Observatory without any provision of a popular description for which it was originally intended.
> Unfortunately there was nothing to keep our constitution alive in the minds of the public,—nothing to allure additional subscribers to our funds so as to extend the Building and fit it with a theater & apparatus for popular purposes—no Lecture was established; and in short the original object fell dead in the hands of the Directors. I thus personally lost my object in this Establishment (Ibid 3-4).

In his 1832 *Edinburgh Encyclopaedia*, Brewster referred to the Astronomical Institution's camera obscura as the observatory's "chief object of attraction" ("Observatory," 571), and after its removal, tourist guides such as *MacDowall's New Guide to Edinburgh* (1843) and John Willox's *The Edinburgh Tourist and Itinerary* (1847) would continue to promote it. By his publication date, the camera obscura in the Gothic Tower had been dismantled for years, yet Willox described the instrument as "one of the principal enticements to casual and unscientific visitors" and explained that access required Astronomical Institution membership, payment for an annual subscription or introduction or a written order by a shareholder (185).

Professionalization & Reform

The camera obscura and popular observatory of the Astronomical Institution were open for use when Maria Short founded her installation. Nevertheless, the relationship between Short's Observatory and the owners of the Gothic Tower was not simply one of competition. Considering Maria's project an affront, the Astronomical Institution likely worried that its proximity might compromise their elite status and prestigious location on Calton Hill—the "Acropolis" to the "modern Athens" that was nineteenth-century Edinburgh (Britton). Those wanting to elevate science might have deplored any reminder of the classroom showmanship by university professors that they already sought to suppress. For example, soon after Maria took possession of the Great Telescope, Professor Leslie was forced to withdraw his request (dated February 3, 1829) to Town Council for permission to offer a "course of popular lectures in Experimental Philosophy […that devoted…] a larger space to Astronomy" (4 Feb 1829, ECA TC Minutes [203] 429-430). Consulted by magistrates concerned for the "dignity and respectability of the University," the Senatus Academicus ruled that "the practice of giving such course of lectures by professors within the precincts of the University was inexpedient and ought not to

be repeated," even though they acknowledged that Leslie had recently given similar classes without objection and so was "justified in making the proposal" (25 Feb 1828, ECA TC Minutes [204] 36-37). In other words, town and gown, which both had stakes in the Astronomical Institution, had grown less tolerant of efforts by university professors to increase their income by popular means.

In Maria Short's time, the nature of British science was changing. The salary structure of the university may have augmented its spectacular and popular nature in Edinburgh, but contemporary movements towards professionalization would see that shift along with its traditional reliance on patronage. Yet the movement was not only based on the desire for stable income and research funding. The creation and reinforcement of disciplinary boundaries was happening on multiple fronts. By the early decades of the nineteenth century, problems wrought by the entanglement of the scientific with the aristocratic emerged amidst other disruptions within science and politics. The Royal Society of Edinburgh (founded in 1783) had evolved out of Maclaurin's Philosophical Society and from its beginning, the RSE was enmeshed and indebted to Tory politics to the dismay of young middle-class Whigs, who resented its "illiberal exclusiveness" (Shapin "Property, Patronage and the Politics of Science" 38). Henry Brougham lamented,

> The Royal Societies are sunk in a sort of *inertia*, or at least are so much ruled by *party*, and what is more by political party, and still worse by *aristocratical* [sic] politics,—that their labours are useless to science (Ibid 39, original emphases).

In London, a large and wealthy population with diverse interests had led to multiple specialized scientific societies that threatened its Royal Society, which had been increasingly denigrated by some of its scientific members for admitting too many amateurs distinguished only by title and affluence. Cambridge mathematics professor Charles Babbage had already founded the Astronomical Society as a breakaway group in 1820, but his dissatisfaction with the RS culminated in his 1830 publication *Reflections on the Decline of Science in England and Some of its Causes.* Babbage criticized the dilettantism endemic to British societies while recommending state encouragement and the professionalization of science, which he argued was already in

place in Prussia and France. In England, Babbage wrote, “It appears that scarcely any man can be expected to pursue abstract science unless he possess a private fortune, and unless he can give up all intention of improving it” (31-32). Edinburgh physicist and editor David Brewster, who was struggling financially and unhappy with the Royal Society of Edinburgh where he worked as its Secretary for several years, straightaway answered Babbage’s call to arms (Morrell “Science, Culture, and Politics” 1-10).

Responding to Babbage’s polemic, Brewster lamented the lack of financial support for Scottish scientific societies or its members, and argued that Edinburgh professors required better salaries to pursue research and thus advance themselves, the university and the country (Brewster “[Review of] Reflexions” 325-326). Along with William Vernon Harcourt, Babbage, and numerous other sympathizers, Brewster founded the British Association for the Advancement of Science (BAAS) in 1831. Brewster’s original hope for the organization was that it would agitate for the state sponsorship of science, whereas the BAAS by 1834 was “relatively indifferent to the question of direct national support for men of science” (Morrell, *Science, Culture, and Politics* 10). Instead the BAAS concerned itself with the promotion of science through public engagement and traveling events. In his journal, Lord Cockburn records that the organization met in Edinburgh in 1934 on Monday, September 8 and stayed until Saturday, and “Every civilised country sent its representatives” (*Journal Volume I* 63). He admits that, “I thought it was a useless institution till I saw it. But I was wrong,” and makes note of the BAAS gathering together “many eminent men” for the convenience of discussing “deep and important matters” and promoting “their future intercourse” (Ibid). Lord Cockburn also observes, ”The evening proceedings brought a crowd together, which, if not instructed, was at least amused by some scientific communication, and this had a tendency to diffuse a growing taste for such subjects,” although he states, “The worst of it is the affectation of science in the tail” (Ibid).

Only a few months before the BAAS met in Edinburgh, considerable opposition had met the proposal for Short’s Observatory. Did the Association’s diffusion of science, or affectation for the taste of it, help soften public opinion about the project and boost the sale of advanced

subscriptions that would finance it? Yet even before the arrivals of the BAAS and Miss Short, other movements afoot in Edinburgh's spaces of science—school and social reform—may have helped prepare an audience for a new, and more accessible, popular observatory. Alongside rejections of dilettantism in professionalized spaces, notions of the *popular* expanded to encompass a broader and less elite audience. In July 1826, Home Secretary Robert Peel established the Scottish Universities Commission to investigate the five universities. At the time, revitalized and new institutions such as the medical schools of Glasgow, Cambridge, Dublin and London University offered serious competition to the University of Edinburgh for students and new faculty, while Town Council battled with the University Senate for control of school administration. Town Council remained in charge of two-thirds of the chairs and many concerned scrutinized each new appointment for evidence of partisan corruption, nepotism or carelessness (Morrell "Science and Scottish University Reform" 39-45). At the same time, the Edinburgh Whigs founded alternative institutions including the School of Arts (now Heriot-Watt University) in 1821 by Leonard Horner, which became the model for Henry Brougham's Mechanics Institutes. In the journal entry that followed his description of the BAAS and Henry Brougham, of whom he writes "never had any moral influence, but is a mere intellectual machine" (*Journal Volume I* 69), Lord Cockburn observed that "other establishments both private and public, are springing up now […] and profess to teach would they call useful knowledge, which means modern languages, chemistry, civil and natural history, physiology, astronomy, navigation, and in Edinburgh, phrenology (70).

In 1832, the Edinburgh Association for Procuring Instruction in Useful and Entertaining Science extended scientific instruction from the elite and artisanal to the petty bourgeoisie, offering inexpensive lectures after business hours to clerks and shopkeepers by capitalizing on the local surplus of expertise. Cockburn described the Edinburgh Association as follows,

> This and similar institutions are strongly characteristic of the times. It is a sort of popular unendowed college where lectures are given to all, male or female, who choose to pay for all the lectures or for a single one. The lectures are on botany, geology, chemistry, astronomy, physiology, natural philosophy, phrenology, and education. They drew in 1832 about £720 from 400 or 500 regular pupils, and had nearly 3000 visitors at 6d. each night. They are on the rise this season. It is a very useful establishment, giving respectable discourses very cheaply to a class of persons for whose scientific instruction and amusement there is no other provision.

> They are of course contumelious of colleges, and are rather more conceited of their knowledge than humble of their ignorance […] In spite of these follies it is gratifying to see hundreds of clerks and shopkeepers, with their wives and daughters, nibbling at the teats of science anyhow. (29 Oct 1834, *Journal Volume I* 73-74).

This new mercantile participation in science, which also fed Short's Observatory, was, according to Steven Shapin beyond the control of Tories, Whigs, or the phrenologists who tried to use the Association to further their own interests in the diffusion of science ("Nibbling at the teats"). The intellectual elites of this period, like Brougham, envisioned science as a means for social improvement, and others, like Babbage and Brewster, envisioned science as a professional career. Science was therefore invested with the potentials to both undermine and legitimate existing orders. Shapin argues that the incommensurability of national goals and local needs halted potential alliances between scientifically minded reformers and the lower classes. Nevertheless, this uncertainty about what science was and what it might do opened spaces for otherwise marginal figures to set up shop.

Short's Observatory

Those trying to prevent the construction of Maria Short's venue on Calton Hill in 1834 mentioned neither the popular observatory of the Astronomical Institution nor its then-operational camera obscura in the Gothic Tower. Yet the promise of greater access to a competing exhibition of similar instruments in proximity to the Royal Observatory site likely caused its proprietors great alarm. Institution records indicate that the private association faced financial concerns in the 1830s with outstanding building debts, ongoing costs of maintenance, their wish to employ a full-time observer, and the additional expense of new instruments to equip him. Their greatest attraction—their camera obscura—facing competition from a newer model that would require neither membership nor subscription, would have threatened their status, exclusivity, and their treasury. Institution subscribers paid £5 annually, whereas Short sold annual, semi-annual, and quarterly subscriptions for £1, 12 shillings and 8 shillings respectively and single tickets at 1 shilling per entry (ROE A.I. 3 [AI Minutes I]; "Conditions of Admitance" figure 8). Did the Institution shareholders who had each invested at least £25, fear the loss of income and participation from those who might prefer cheaper rates

and one-time tickets, or did they consider the proposal, which permitted access to the working class and other strangers, a bastardized form of their own project and an affront to their loftier intentions and distinction?

In a special assembly called to discuss the matter, Astronomical Institution members voted unanimously to oppose Maria Short's exhibiting "on any part of the summit on Calton Hill," but agreed that if pressed, they might consent to allowing her the "waste ground intended for a Debtor Gaol" (21 July 1834, ROE A.I. 4 [AI Minutes II], 88). The association formed a committee to draw up a petition to present to Town Council, which included mathematics professor William Wallace, who acted as temporary part-time Observer and the optician Alexander Adie, who with his first partner (his uncle John Miller) had installed the Institution camera obscura. With Solicitor-General Lord Cockburn joining their protest, they achieved temporary success. The petitioners managed to intervene in Maria Short's Calton Hill tenancy agreement with Town Council in summer 1834. However, the City approved her proposal to build on a slightly less prominent location on the hill a few months later, ironically in the very meeting that saw the contract approval of Thomas Henderson–who as the new Professor of Astronomy would be the first full time Observer to work at the Royal Observatory.[98]

Short opened her observatory the following year, west of Henderson's new place of employment with the screen of columns of the never-completed National Monument between them. Subscription pamphlets circulating before and after its installation demonstrate that Short's camera obscura had been ordered but not installed until at least a year after the venue's opening. These documents indicate that Short placed her camera obscura commission with "Dollond of London", and also specify that "Tulley of London," (supplier of the Astronomical Institution camera obscura) had repaired the Great Telescope of James Short and supplied her with a ten-foot achromatic refracting telescope. A handbill from the 1840s indicates that Dollond provided Short with other instruments including a "grand compound microscope with achromatic object glasses," an "elegant orrery" and a "grand solar microscope" (figure 14). It describes a "splendid camera obscura" (perhaps a new or updated device) by Davidson as being based "on an entirely new principle, the ONLY ONE of the KIND in

Europe." Its maker may well have been Thomas Davidson. A local optician who began experimenting with the daguerreotype process soon after its invention, Davidson had used a camera of his own design to take the first known photograph of Edinburgh in 1839—an image of Calton Hill. That picture or a similar one made soon after, supplies the only photographic evidence of Short's Observatory on Calton Hill. Davidson captured an image of its dome, rising from the contours of the hill to the east of Nelson Monument (figure 9).[99] Having developed lenses "capable of giving larger pictures than had been hitherto attempted" for landscape photography, and inverting that process to enable miniature portrait photography, chances are that Davidson possessed the skill to improve Short's original camera obscura.[100] Her handbill goes on to explain,

> This instrument, which can be used either with or without Sunshine, displays the Magnificent Scenery around the Calton Hill—the Forth—the Mountains, Vales, Villages, etc.—with the throngs of Passengers on the Roads, and Groups of Saunterers on the Hill—affording a MAGICAL PANORAMA of the FINEST VIEW in the WORLD.

Yet even before innovations potentially implemented by Thomas Davidson in the 1840s, reviews of a contemporary camera obscura at Dumfries, which also opened in 1836, suggests that Maria's original device already had improved on the old Gothic Tower apparatus. (Remember, Ben and Dolly Holroyd had already claimed to have a better camera obscura than the Astronomical Institution in *The Scotsman* on July 9, 1823). The Dumfries and Maxwelltown Astronomical Society had approached the suppliers of the Edinburgh Astronomical Institution (then known as Adie and Son) to equip their new observatory. Although their project was popular in nature, they were a private, members-only society like the Astronomical Institution.[101] Ultimately, they rejected the proposal of the Edinburgh instrument makers in favour of Thomas Morton of Kilmarnock.[102] On meeting with Dumfres and Maxwelltown Astronomical Society representative Robert Gordon and civil engineer John Jardine in Edinburgh, Mr. Adie (either Alexander or his son, John) recommended a large refracting telescope and a camera obscura similar to the one in the Gothic Tower, which he explained could be drawn inside for protection from the weather.[103] Morton, a manufacturer of carpet-making machinery who had equipped his personal observatory with instruments of his own making, had already offered to make a large reflecting telescope and camera obscura,

presumably like his own.[104] Although the telescope estimates were comparable (around £73 each), Morton priced the camera obscura at £23 10 while Adie quoted £60 to replicate the Gothic Tower device. On condition that their member and noted polar explorer Sir John Ross inspect the new instruments, the Society accepted Morton's proposal.

Today, Morton's camera obscura at Dumfries remains the oldest extant working device of its kind. A door on its turret closes to protect the lens, and a system of counterweights eases the lifting and lowering of its tabular screen to adjust image focus. In 1836, the Dumfries Courier reported the device as being "much superior to the kindred one so often visited at the institution on Calton Hill, Edinburgh [the Gothic Tower camera obscura]." Having visited it a few times myself, I can attest to the clarity and vibrance of the Dumfries projection, the scope of its picturesque view past the village and into the surrounding countryside, and how the gentle rise and fall of its table adds to the elegance of its operation. Yet to explain its effect on a contemporary visitor, I quote here extensively from an 1836 review:

> Its exact range of action we do not know, but we caught various glimpses of the outline of the Cumberland hills, and many interesting objects in the vale of Nith both below and above the town. The colouring is as perfect as eye could desire, and as the weather on Saturday was breezy in the extreme, it was beautiful to observe huge masses of river water chafed into foam as it hurried along – trees, bushes and grain bending to the blast, and smoke escaping from chimnies so vividly depicted, that you almost fancied you could clutch it as one landscape passed away and was succeeded by another. A boy who was present whispered to some one that the figures came and went on the object table, reminded him of Bonaparte's soldiers crossing the Alps in Mr Thoidon's mechanical theatre; and the remark was perfectly natural and just. An old man, carrying two baskets of fruit, was seen pausing as he descended the Corbelly-hill, to re-arrange blades which the wind had tasselled, just as distinctly as if he had been in the cone where the spectators were stationed at the top of the Tower. Ladies, too, were seen ascending the hill, and their persons identified; as well as a lady and gentlemen walking in a garden, and the anon resting in a summer-house, who might be lovers for aught we know to the contrary (3 August 1836).

While its local newspaper praised its counterpart in Dumfries in a detailed review, I found no equivalent for Maria Short's camera obscura, despite the earlier controversy it had inspired. Memorialist J.A.H. Macdonald recalled Short's Observatory on Calton Hill as a "sorry affair," and wrote only "a *camera lucida* or *obscura*—I forget which—enabled the visitor to see the country round on a flat, white table" (200). Nevertheless, Alison Morrison-Low and Sara Stevenson note that local artists likely frequented her device since painters James Skene and Alexander

Nasmyth, and photography inventor Mungo Ponton appear in her list of subscribers (*Scottish Photography* 8). Their circle included poets and natural philosophers, as well as other painters and inventors then working to develop photographic technology, but there is no way of knowing who among them visited Short's Observatory as single ticket holders.

A proposal to Town Council in 1845 provides an account of Short's Observatory by the owner herself (Appendix E). In it, Short explains that she had been prompted by a "number of highly respectable Citizens of Edinburgh" to build an "improved Observatory" that could better accommodate what astronomer James South (founding member and President of the Royal Astronomical Society, 1829-31) had esteemed the "very excellent" instruments in her collection (28 October 1845, ECA TC Minutes [244] 474). Her building held only about twenty visitors at a time, and its small size could not accommodate the use of the Great Telescope by James Short that had been the initial impetus for her project, nor her ten-foot refracting telescope by Charles Tulley. Wind on the hill precluded their use outside as well, and its chills inconvenienced the visitors forced to wait outside her crowded establishment, which itself offered little protection from the cold. Although Short made no mention of her splendid camera obscura, she explained that as well as blocking night time views of the moon and planets at certain times of the year, the National Monument made her solar microscope unusable for two hours each day, with the shadow it cast over her building (figures 10 and 11). A solar microscope was used to project magnifications of microscopic specimens, and like a camera obscura, it relied on sunlight to illuminate its imagery. In all likelihood, the daily obstruction of sunlight that interrupted the operations of the solar microscope would have also compromised the brightness of her camera obscura. Town Council rejected Short's application for construction on the basis that no private individual could own property on Calton Hill. However, the magistrates advised the formation of a committee to consider the establishment of a popular observatory in a public building on Calton Hill (Ibid).

Nelson's Monument

While accounts of Short's Observatory are rare, mentions of the competing camera obscura installed steps away in Nelson's Monument within travel guides and histories are almost

entirely absent. Although its neighbours—Short's Observatory and Forrest's Statuary—are subject to Macdonald's harsh criticisms, the memorialist limits his reminiscence of the 105-foot (32m) hilltop tower to the ugliness of its overall design.[105] While others also condemned its appearance, likened by Robert Louis Stevenson to both "telescope" and "butterchurn" (123), its optical device seems to have left little lasting impression.[106] Yet for Maria Short and her supporters, the opening of the third camera obscura on Calton Hill would have smarted—much like Short's Observatory had upset the Astronomical Institution fifteen years earlier. The Gothic Tower camera obscura had already been out of service for a decade when Short's Observatory faced new competition. In May 1849, the following notice appeared in a local daily:

> The largest and most magnificent CAMERA OBSCURA known has just been erected, by the celebrated optician MR. ADIE in one of the apartments of Nelson's Column. Its powers are astonishing—small objects many miles off being seen with wonderful distinction and accuracy, while the beautiful and romantic scenery that surrounds the city, as well as animated objects around the Hill and in the centre of the Town are pourtrayed [sic] with astonishing clearness, minuteness and fidelity (*Caledonian Mercury* 28 May 1849).

A history of this mysterious and forgotten device emerges from close readings of Town Council Minutes, newspaper accounts and advertisements that suggest collusion among Short's rivals both old and new. Located on the southeast side of the summit and nearer to Short's, the monument to naval hero Admiral Horatio Nelson had been owned and rented out by the City of Edinburgh since its completion in 1815, with its first tenant Mrs. Kerr running a kind of teahouse until her departure in 1848.[107] Assessing the use of the "prominent deformity," Lord Cockburn complained in a pamphlet published in 1849,

> This monument to a dead hero has a tavern, or at least a refection shop, in its inside. It is probably the only monument in the world that is let; and where honour to the dead is combined with feasting for the living ("Letter to the Lord Provost" 10n).

Perhaps unaware of its presence, Cockburn made no mention of the recently installed camera obscura. He was a busy circuit judge, and after all, the device been placed in secret. For neither Mr. Adie (likely John) nor the Monument's new tenant, Thomas Ker (likely no relation to the original tenant, Mrs. Kerr) had obtained advance permission from Town Council to install the

new device. And Ker had only recently rented the property from the City, having competed for its lease with none other than Maria Short, who had openly proposed a similar scheme.

Upon the retirement of Mrs. Kerr, the teahouse operator, Short (through her husband, Robert Henderson) generously offered Town Council £60/year rent for use of the tower alone. Unlike Kerr or Ker (who offered £80 for the monument, residence and grounds) they had no need for its associated cottage. In their rental proposal to Town Council, Henderson explained,

> [M]y object in obtaining the lease is in addition to the usual occupancy of the Monument itself to enable the Citizens of Edinburgh to obtain a command of the western heavens through our Astronomical Apparatus and the Application has been made chiefly in consequence of the many complaints that have been made to us by parties desirous to obtain this view which the present position of Short's Observatory precludes (1 February 1848, ECA TC Minutes [249] 207).

Short and Henderson's bid for the monument followed their request to the City three years earlier to build a permanent stone structure for Short's Observatory, at an unused site on the hill that offered better prospects. Remember that proposal had generated the notion that the City institute its own popular observatory on Calton Hill.

Though Town Council Minutes make no further mention of that idea, and there is no indication of Ker's intention to install a camera obscura in his rental application, the furtive transformation of Nelson Monument suggests that the notion crafted in City Chambers at the prompting of Maria Short's 1845 request had come to fruition. In the absence of definitive evidence, there is no way to determine whether that happened by serendipity or machination. However, the timing and lack of concern by city officials about the surreptitious installation is suspicious. In March 1847, as the Astronomical Institution completed its transfer of the Royal Observatory to the monarchy, the following letter to the editor appeared in *The Scotsman*:

> Sir,—On referring to the history of observatories and astronomical establishments in Brewster's Encyclopaedia, I find that the plan adopted at Glasgow formed also part of the original objects of the Edinburgh Astronomical Institution, vis, to have besides the scientific department, "a popular observatory furnished with instruments connected with the science, of general and easy use, calculated for students and amateurs : also globes, maps, atlases, charts, and books." These are the express terms used; and it occurs to me that it is the very thing most wanted, and to obtain which every effort should be made in the event of the observatory not being sold. Of course, such a provision for the public implies annual subscriptions; and allow me to repeat that I cannot doubt that if the public were fairly appealed to, they would come yet to the rescue. The

> numbers that visit Short's little observatory—a fact shown by the names recorded—is of itself almost enough to convince one that it is not the fault of the public that an institution on the large scale has to go a-begging to Government. The obvious means has not been employed to make its finances flourish.
>
> By the way, I perceive that the Lord Provost and Convener of Trades are, ex-officiis, directors of the Astronomical Institution. The citizens may surely look to them for some effort to retain an establishment which, if properly supported, would prove a credit to the spirit and character of the Scottish capital.—I am, etc.
> OBSERVER
> Edinburgh, March 1, 1847.

What is likely the Astronomical Institution's original camera obscura appeared at auction soon after, almost nine years following the order for its removal from the Gothic Tower. A catalogue of instruments belonging to the Royal Observatory of Edinburgh, printed for auction by Tait and Nisbet in their "Great Room" on Hanover Street in Edinburgh on June 19, 1848, lists two popular items of the kind that would appear at Nelson Monument: 1) a "Splendid Camera Obscura, of the largest size and best construction; complete with adjustable table, having a concave plaster surface, slow motion rods and handles, large reflecting trough, etc.;" and 2) a "Solar Microscope, complete in a mahogany box, with various magnifying powers, sets of slides with microscopic objects, etc.,"[108] What was the connection, if any, between the Gothic Tower instruments, the auctioned instruments, and the Nelson's Monument instruments? Was the new camera obscura made from parts of the old device? And given ties between members of Town Council, the Astronomical Institution and the opticians Adie, is it possible that the goings-on in Nelson's Monument were not so secret after all?

Placing a camera obscura in Nelson Monument required puncturing its roof to install its optical assembly and that a major structural alteration to city property had been done without prior municipal sanction troubled fewer town councillors than one might expect. *The Scotsman* reported that the long discussion in City Chambers on the matter held "little public interest" and while a Dr. Renton remarked that the conversion of the monument into a "place of exhibition had been made by certain parties in a kind of underhand manner," his suggestion that policemen be stationed there to monitor the hiring of carts for churchgoing on Sundays was met with laughter (*The Scotsman*, 9 May 1849). Three days later the newspaper ran an

advertisement for the site boasting views "much more extensive, complete, and clear, than any obtainable hitherto," and announced admission charges for Gentlemen (6 pennies), Trades-people and Children (3 pennies) (*The Scotsman*, 12 May 1849). In transforming Nelson's Monument into what was essentially a third popular observatory on Calton Hill and ostensibly opening it to an even larger public, it seemed as though Ker was attempting to supplant the business of Maria Short. At the Town Council meeting that followed, Short's supporters on Council motioned against the approval of the previous meeting minutes and filed "Reasons of Protest." Councillors Robert Ritchie, David Ridpath, Alexander Wright, Robert Anderson and George Drummond all signed a document that condemned the repurposing of Nelson's Monument and the structural changes that it had entailed (22 May 1849, ECA TC Minutes [252]). Moreover, they stressed that a rival establishment would incur potential financial losses to Short and might force her closure, which effectively reversed the original compensatory purpose of her being granted the right to exhibit on Calton Hill. Finally, they argued that as "representative and curators of the Public" they were duty bound to "encourage rather than retard the diffusion of science," but were convinced the latter rather would result if the Nelson camera obscura was permitted to remain (Ibid).

However, little came of the protests against Nelson's in defence of Short's. Five weeks later, other members praised Ker and his splendid camera obscura in a Town Council meeting. *The Scotsman* reports that Baillie Stott discussed a recent visit to the monument's device, describing "a most vivid outline of almost all that was going on in the streets of Edinburgh" and assuring "the treat was of no ordinary kind, and worth ten times what was charged for it, while the courtesy and attention of Mr. and Mrs. Kerr [sic] could not fail to secure the approbation of all who visited the monument" (*The Scotsman*, 4 July 1849). Mr. Fraser reinforced Stott's compliments with his own, commenting also on the "beautiful manner in which the grounds around the monument were kept by Mr. Kerr [sic]" (Ibid). While, ensuing conflicts between the exhibitors would culminate in the expulsion of Maria Short from Calton Hill the following year, let's first consider the fate of the Nelson's Monument camera obscura.

To supplement the projected sights offered on screen at Nelson's, and for those who could manage the additional 143-step ascent to see the panoramic view from the monument's platform, Ker installed additional attractions during his tenancy. Promotions of Nelson's Monument never call it a popular observatory, but the individuals and instruments associated with it enhanced existing links between the camera obscura, spectacle and astronomical science. A notice in an 1852 edition of *The Scotsman* announced,

> A SPLENDID CAMERA OBSCURA
> Affording to the visitor an interesting and very amusing View of Edinburgh and Vicinity.
> Also VERY POWERFUL TELESCOPES with a MAGNIFICENT SOLAR MICROSCOPE by ADIE,
> There has also been added a Series of very wonderful
> COSMORAMIC VIEWS (by an eminent Artist) of
> HER MAJESTY'S PRIVATE APARTMENTS.
> With DIORAMIC VIEWS of LONDON and EDINBURGH, etc.
> Admission for the whole, including Top View. 1s
> Working Classes and Children. Half Price.
> (*The Scotsman,* 19 May 1852).

The references to Adie, as respected and well-known instrument makers with significant ties to the scientific community (as society members, suppliers, inventors and Thomas Henderson's in-laws), might have added to the project's credibility.[109] However, there appears to have been only a few newspaper notices. Perhaps the site's architectural prominence eliminated any need for additional publicity.

The prospects of Nelson's Monument are mirrored by its visibility. At its top, it can both see and be seen by much of Edinburgh and the port of Leith below, and this attribute led to a formal relationship with its neighbour, the Royal Observatory. Beginning in the early 1850s, Scotland's second Astronomer Royal, Charles Piazza Smyth, triggered the lowering of the large time ball on a pole atop the Monument each day at precisely one o'clock. A few years after Adie installed the camera obscura, this visual time signal (preceding the first firing of the daily one o'clock gun, an aural time signal, at Edinburgh Castle in 1861) enabled ships at port (as well as anyone else in view) to accurately reset their chronometers.[110] Navigation required accurate timekeeping, which fell within the duties of observatories, along with astronomical research and other responsibilities such as monitoring the weather. Providing both function for Scotland's official Observer and pleasure for its amateur astronomers, Nelson Monument

would have fulfilled in some way the Calton Hill dreams of the Astronomical Institution. Through the efforts of Ker and Adie, site- and sky-seers could enjoy the use of optical instruments from an ideal vantage point, in a place formally affiliated with the pursuit of astronomical science.

The Gothic Tower and Nelson Monument still stand on Calton Hill but where camera obscuras sat within them remains unknown. That no nineteenth-century images of the buildings' exteriors depict a turret is perhaps unsurprising since their installers, the Adies had recommended to Dumfries that rooftop optics be drawn inside for protection.[111] Yet the 1849-50 surveys of Nelson Monument made for the time ball installation, kept by the National Archives of Scotland, do not indicate the presence of a camera obscura either (NAS RHP6533/1/2). However, while is it probable that Alexander Adie placed the Astronomical Institution apparatus in the uppermost storey of the Gothic Tower, his son John Adie would have made the later installation somewhere in the lowest storey of Nelson Monument. By the late 1850's both Adies had passed away, but it appears that the camera obscura remained in the Nelson Monument until 1863.[112] Early that year, Edinburgh saw extreme weather and a severe thunderstorm brought a fire that ravaged "the roof of the camera-obscura room in the basement-storey of Nelson's Monument" (*The Scotsman*, 5 February 1863, 2). Lightning struck the last rival of Maria Short on Calton Hill. Meanwhile, one mile west on Castlehill, Short busied herself with her new popular observatory, the place where a splendid camera obscura still provides its visitors with virtual tours of the city.

Short Stopped

Was there merit in the accusations of aggressive solicitation and refusals to cooperate directed against the former Miss Short? Earlier reports suggest that trouble associated with the unruly proprietress began before the installation of the Nelson Monument camera obscura, but it is possible that she already had enemies in the press. In the summer of 1844, *The Scotsman* described the irritations to people strolling Calton Hill by her alleged practices, which she defended by stating,

> [A]ll I have ever done has been simply to point out the Observatory to strangers, as it is entirely out of view from the western approach - the way invariably taken by them in ascending the hill - and to hand a bill explaining what may be seen at any time by the different apparatus to suit the constantly varying states of the atmosphere; and I trust that this privilege, common to every citizen of Edinburgh who requires it, will not be denied to me (*The Scotsman* 11 August 1844).

The newspaper nonetheless asserted that "It is the teasing and pestering to […] that is felt to be a nuisance; and that this practice has been carried out for a long time is notorious," further quoting police Captain Haining in his assertion that "the subject to which it refers has been under the consideration of the Magistrates here for some time, and the Police have been doing all they possibly can for the suppression of the annoyance" (Ibid). A few months later, the matter saw further developments. At a meeting of Town Council,

> Bailie Gray then moved, that as Mrs. Henderson, formerly Miss Short had disregarded the order of the magistrates and council, they now recall the privilege afforded to her and refuse her a site on the Calton Hill. The Bailie detailed the various ways in which the proprietors of that Observatory had annoyed the public by canvassing for visitors; and evaded the regulation which he had laid down for their guidance. He regretted the necessity for making such a motion; but the authority of the Council having been repeatedly set at defiance, he had no alternative. After some discussion, in the course of which Mr. Grierson attempted to show that Mrs. Henderson was not worse than the other exhibitors on the Hill, it was remitted to the Lord Provost's committee to consider the matter and report ("Short's Observatory, Calton Hill" *The Scotsman* 9 October 1844).

The 1844 attempt to remove Short's Observatory came to little, and soon after Town Council dealt with their previously discussed request to build a new venue from stone. As for "the other exhibitors on the Hill," Councillor Grierson referred to the Forrests of Forrest's Statuary. In all likelihood, a rivalry between neighbours had developed. On May 24, 1845, the day of "Her Majesty's Birthday" notices for both sculptor garden and popular observatory appeared in *The Scotsman.* Short's Observatory announced that it was open for half price and showing the newly invented "Chromatrope," while Forrest's Statuary then in its "fourteenth season" promoted its new grouping of figures "representing Charles XII and a Cossack prince regaling under an oak," and furthermore promised "No Canvassers employed on the Hill to hand bills or otherwise recommend this Exhibition." The 1848 arrival of the Kers at Nelson's Monument seemed to increase the tension between Forrest's and Short's. In June 1848, Robert Forrest wrote to Town Council "complaining of a number of Idlers who frequent public walks, and

solicit strangers to visit Short's Observatory" (13 June 1848, ECA TC Minutes [252] 102). His complaint was remitted to Bailie Melville, who during his investigation, received similar complaints from Thomas Ker. Melville met with all three parties and suggested for the first time that they jointly pay a single Guide to Strangers to settle their conflicts (Appendix F). Ker and Forrest agreed to comply, but the indomitable Maria Short refused.

The morning of September 27, 1850, saw the controversial and dramatic ousting of Maria Theresa Short and her popular observatory from Calton Hill. For after fifteen years of operation, by mandate of the Lord Provost and Town Council of Edinburgh, "without any notice, the Observatory was invaded at an early hour, the Instruments were thrown upon the hill, and the building demolished" (Appendix H). The next day, readers of *The Scotsman* would learn about the "Removal of Short's Observatory," though not about how the dramatic eviction took place nor the controversial nature of its ruling. Its reporter wrote only that,

> In accordance with the resolution adopted at last meeting of the Town Council, the exhibition on the Calton Hill, known as Short's Observatory was removed yesterday morning, under a warrant from the Sheriff. This exhibition, from a number of causes, has been a fruitful topic of discussion for many years at the Council Board, to the exclusion of other and more important matters (28 Sept 1850).

After the Town Council meeting that followed, newspapers quoted Councillor David Ridpath who raged against what he decried as "a motion to destroy science" (*The Scotsman*, 3 October 1850; *Caledonian Mercury*, 4 October 1850). They reported that although outnumbered by a majority of 18 to 7, some members supported his refusal to approve the minutes of the previous meeting when the order was passed. It was further revealed that a motion by Councillor Robert Ritchie to also disapprove the report on Short's Observatory delivered by Procurator Fiscal R.L. Dymock was dropped only "after a long discussion, in which considerable feeling was displayed." Afterwards, the matter appeared settled according to the press, but "considerable feeling" would continue to run high.

In a book published two years later, Scottish travel writer Samuel Laing (1780-1868) recounted the destruction of Short's Observatory on Calton Hill, possibly having heard rumours of other factors at play. About the removal, Laing wrote,

> [I]t was a great educational means, honourable to the city; but it was swept away one morning by order of the provost, baillies, and town council, because the proprietrix's servant had insulted the dignity and disturbed the quietude of a town councillor's digestive walk on the esplanade, by thrusting into his hand a bill of the wonders of animalculae exhibited by the microscope in a drop of water. The telescope was not surpassed by more than four or five in Scotland. It was, or ought to have been, a hallowed instrument in the eyes of the people of Edinburgh, for it had stood on the Calton Hill, accessible to the public for sixpence, for at least sixty years; and it is highly probable that many of the eminent men Scotland has to boast of in natural philosophy, — Playfair, Leslie, Brewster, Forbes, Nichols, Brougham,— have been beholden to, or have looked through, or possibly may have drawn their inspiration, their love of astronomical and optical science, from, their sixpenny peep, as school-boys, at the heavenly bodies under the regime of old Short, the astronomer. And this instrument was dislodged, thrown out on the green, its roof and walls torn down, and a most useful educational means destroyed, by the lord provost and town council of the modern Athens, no Athenian raising his voice against it, because a foolish quarrel arose between the proprietrix of the establishment and one of the town councillors! (393).

In their extensive review of the publication where this description appears—curiously an account of travels in Denmark—*The Scotsman* contended that Laing was "so grossly misinformed and unjust" about Short's Observatory that it almost removed "the edge" from other criticisms the writer levelled against the people of Edinburgh, a topic that I discuss below ("Literature," *The Scotsman*, 26 June 1852). Whether *The Scotsman* took umbrage at his accusation that an unnamed town councillor had mounted a campaign against Short's Observatory because an employee had interrupted his constitutional on the hill, at the mistaken notion that the Great Telescope had been accessible and usable there for sixty years, or whether the reviewer refuted some other whim of Laing's fancy, cannot presently be confirmed any more than the potential merits of his speculation. However, it is evident that, by ignorance or omission, Laing had failed to countenance the spirited defences of Short's Observatory by citizens of Edinburgh, both within and beyond City Chambers.

"Reasons of Dissent and Protest" regarding the removal of Short's Observatory appear in the October 22, 1850 minutes of Town Council (Appendix H), and it is the third of three sets of written complaints submitted by councillors Ridman and Ritchie for transcription into Town Council minutes between 1849 and 1850. Alongside other supporters on Town Council, the two championed Short's Observatory after threats to its existence advanced with the opening of the camera obscura in Nelson's Monument and surged alongside competition between Calton Hill

exhibitors in the months that followed. The first of these “Reasons for Protest,” is one earlier mentioned against the installation of the camera obscura at Nelson’s Monument. Entered into the minutes of May 22, 1849, it argues against the retroactive approval of the Nelson camera because of potential losses incurred to Short (then also known as Mrs. Henderson), while a second set of protests appears in the entry dated June 18, 1850 condemning a motion to remove Short’s Observatory that had passed in the previous council meeting held June 11 (Appendix G).

Orders against Short’s stemmed from the alleged refusal of Maria to conform to regulations set by Town Council to reduce aggressive solicitation on Calton Hill—an accusation that her defenders on one hand questioned, and on the other, claimed as the result of rivalries between exhibitors that the council itself had fostered. Alongside Short’s Observatory and the Nelson Monument display, Council had approved the installation of Forrest’s Statuary, an exhibition of sculptures mounted in a temporary hall that sat within the enclosure of the National Monument on its east side. Unsurprisingly, the proprietors of the three attractions—Short and her husband Robert Henderson, the Kers, and the Forrests—competed for customer revenue. The councillors who defended Short moreover argued that the Council could have easily avoided being “so frequently been worried or molested on the subject,” by “laying down stringent rules” and then leaving it to the city police to enforce and investigate potential violations in an “ordinary way.” Instead Town Council placed one of its own members (the Dean of Guild) in charge of the matter, who employed a guard for Calton Hill at the expense of its exhibitors. Such measures, they contended, practically ensured that ensuing complaints would be directed back to Council.

During its meeting on January 8, 1850, at the recommendation of Dean of Guild Wilson and in spite of the submission of a written protest by Maria Short, Town Council instituted its “Rules for the Guide to Strangers Visiting the Calton-Hill,” without a vote—an act from which Ritchie officially dissented. They mandated the appointment of Peter Logan, who as the uniformed guide for Calton Hill, would be the only person permitted there to direct visitors to exhibitions.

Sworn in as Constable and given a baton for his rounds, the Rules summarized Logan's duties as follows,

> To place in the hands of Strangers cards referring to the different exhibitions, to be furnished to him by the City. To answer respectfully all enquiries made by Strangers and to avoid every thing which shall show a preference for one exhibition over another. To do what he can in conjunction with the Police to keep the Hill free from improper characters. From time to time to report to the Magistrate in charge of the Hill any thing he may observe amiss or as to which he may require further instructions (9 Jan 1850, ECA TC Minutes [254] 165).

That same month, City Magistrates refused Short's £105 offer to outbid the current lease on Nelson's Monument and agreed "after some debate" to extend their existing arrangement with the Kers who paid only £80, 10s. Furthermore, *The Scotsman* reported that

> Several members of Council were warm in their praise of the way in which the Monument had been managed since it came into the possession of Mr. Kerr [sic]; while they condemned, in severe terms, this attempt of Mr. Henderson [Short's husband] to get possession of the Monument" (23 January 1850).

Perhaps to make up for the shortfall in potential rental income, the Council decided to charge Short £24, 10s for ground that they had previously granted her at no expense.

The June order to evict Short's Observatory followed a report by the Guide to Strangers (presumably Logan) that "Mrs. Short or Henderson had disobeyed the regulations of the Council, and had persisted in allowing parties in her employment to hand bills to people on the hill and otherwise annoy them, in regard to visiting her Observatory," an allegation that in a written memorial submitted soon after she would deny.[113] Even though her defenders in City Chambers would argue that the constable should have been questioned under oath and Short allowed to defend herself according to other proceedings of law, the proprietrix offered to conform to any conditions that Town Council set and requested that her withdrawal from the Hill be delayed. Additionally, a petition signed by 4000 residents requested that the magistrates modify their resolution "on the ground that the removal of the observatory would be a great public loss" (*The Scotsman*, 13 July 1850). None of the attempted measures however stayed the decision of Town Council, and as she and her defenders continued to search for ways to maintain the observatory on Calton Hill, Short refused to voluntarily quit Calton Hill.

> The LORD PROVOST said he had had more annoyance with this woman, during the last eighteen months, than with all the other business of the Council. He begged to say, however, now that the resolution was adopted, that he had no objection to consider any memorial that she might present to lease or sell the premises to a third party (*The Scotsman* 19 June 1850).

At the September 17 meeting of Town Council, Dean of Guild Wilson requested a decision be made regarding Short's Observatory, pointing out that each of the three appeals to stop the removal had been rejected and Short's legal expenses were as yet unpaid. Consequently, the motion for forcible eviction passed by a vote of 12 to 6 with four members abstaining. The resulting action lead to the final "Reasons for Protest and Dissent" submitted to the Minute Books in relation to Short's Observatory. Drafted for the October 22 meeting by Robert Richie and signed also by Councillors Ridpath, Alexander Hay and Robert Anderson, the document recounts the unanticipated destruction of the venue and the rough handling of its instruments, and argues that the "irregular and *ultra vires*" execution of the order, hastily done without the requisite approval in a subsequent meeting, precluded Council members from learning that the Lord Provost's condition that Short's Observatory change management had indeed been met. As evidence, the councillors submitted a petition by four gentlemen who had voluntarily accepted its trusteeship, which was being "printed and circulated" at the time the destruction was taking place. They also resubmitted the petition signed by four thousand residents, and an earlier note from the Sheriff who described the removal of Short's Observatory "so capable from its nature of affording at once amusement and instruction" as "a matter of regret" that would best be avoided through a new arrangement (13 Aug 1850, ECA TC Minutes [254] 275-77). The protesters further averred that the "harsh and precipitate" proceeding was "discourteous and calculated to be most injurious," and given the expense of constructing and equipping the building, in the absence of Mrs. Henderson being allowed a "fair hearing," they refused any personal liability for damages she might claim. While I found none of the original documents submitted—the guide's report, the petitions, Maria's responses, etc.—I also found no further claims or arguments with regards to the Calton Hill affair within the Town Council minutes. Aside from the Liang's description, there is a single comment made in an election meeting the following year. Dr. William Glover summarized the event by saying, "It might be

legal to order the removal of the observatory, but it was neither just nor honest.“ (“Edinburgh Municipal Elections,” *The Scotsman*, 18 October 1851.)

Part Three: Visualising Discourse

> *Les accusations qui seront lancées au XIXème siècle contre les artistes qui se retranchent dans leur tour d'ivoire, paraissent ici littéralement fondées. Ce lieu souligne la hauteur, la distance et la rupture avec l'extérieur, et paraît faire écho à la disjonction opérée par Kepler entre observateur et image. L'oeil, qui semble tant faire corps avec nous, peut en réalité être aussi inaccessible que la camera obscura perdue dans une tour. Notons que de nombreuses ville d'Angleterre et des Etats-Unis comportent une camera obscura donnant souvent lieu à un véritable <tourisme>, ce qui témoigne d'une tradition anglo-saxonne encore très vivace en ce domaine (Bubb 170).*[114]

Although she buries it within a chapter that ostensibly speaks to Dutch painting in the seventeenth century, Martine Bubb writes a single evocative paragraph about the splendid camera obscura on Castlehill in Edinburgh. Her comments (quoted above) follow an identification of the building by its first two names—Short's Observatory and Outlook Tower—along with its founder Maria Short, who built and opened the tower in the mid-nineteenth century after the destruction of her Calton Hill site, and its most known promoter Patrick Geddes, who refurbished and reimagined the venue at the century's end. Bubb's reference to the late-nineteenth-century critique of ivory-towerism is apropos, given the application by Geddes of the building and its device as epistemological tools that linked to his role as an academic scholar. Bubb furthermore recalls the seventeenth century astronomer/mathematician Johannes Kepler and attributes to him, an understanding of disconnect between image and viewer achieved through a set of spatial relations—"height, distance and a rupture with the interior." This description of Kepler's assessment underlines Jonathan Crary's theory of the camera obscura as a model of distantiated, and disembodied vision that dominated the seventeenth and eighteenth centuries, by expressing an exterior/interior relation that separates the sensing body from the knowing mind. And finally, making note of both its architecture and its role as a sightseeing attraction, Bubb makes clever use of the French *tour*—a notion that I adopt and expand on here.

Guided by a word that translates into English as a tower, a promenade, a spell, a turn, and a whirl, this chapter examines multiple and interrelated meanings and discourses of the splendid camera obscura. Here I explore a series of ideological deployments from fields of science and

politics, that are conservative and romantic, reformist and panoptic, and invariably dominant and masculine. In his introduction to *Order in Space and Society*, Thomas Markus identifies two sets of views as "tradition and power" and "progress and power," and he aligns them geospatially and topographically with the summits of Old Town and New Town, which combine to form an image of the "twin power of the Capital" (8). He associates tradition with Edinburgh Castle, and progress with Calton Hill. Visually dominating the city from above, the two locations are also significant as the successive sites of Shorts Observatory. In 1855, Maria Short reopened on Castlehill and her move there from Calton Hill parallels the mid-century rise in conservatism that followed the Reform Acts of 1832, and the rise of working-class Chartism in the 1840s.

From progress to tradition—two prominent men connected to nineteenth-century Edinburgh also exemplify this shift: the elder statesman, Lord Cockburn (1779-1854) and the young critic, Thomas Carlyle (1795-1881), who appear throughout this thesis as nineteenth-century commentators and influencers. Their mutual friend, Lord Jeffrey (1773-1850) belonged to the generation of progressive Whig reformers of the century's early decades, which also included Cockburn and their colleague Henry Brougham. Despite his political affiliations, Cockburn fought to preserve "old houses and trees," and feared the "rise of popular influence" that he worried was helped by his own work on Reform (104, 114). Of Cockburn, the conservative Carlyle said, "A gentleman, I should say, and perfectly in the Scotch type, perhaps the very last of that peculiar species (qtd in Miller, 267). With their differences and commonalities, Carlyle and Cockburn's embrace of, and opposition, to the splendid camera obscura characterize some of the ideological discourses and activities that obscure other meanings and uses of the apparatus. This chapter, and indeed this research, therefore culminate in speculation regarding the more embodied aspects of the camera obscura and its potential to visually undermine and disrupt spatializations of power, class and gender, in ways that would suit neither Whig nor Tory. Because this chapter brings together so many discourses and ideas, I begin here with a relatively detailed introduction and summary.

I translate the "veritable *tourisme*" of Bubb into *towerism,* and begin by considering the splendid camera obscura as an observatory instrument—identifying related installations from

the first half of the nineteenth century, tracing their origins and distinguishing their architecture as a form that, even then, was more ideological than functional. Recalling the romantic notion of the tower-bound astronomer, I briefly discuss Galileo Galilei and his application of an inverted projecting telescope as a kind of scientific archetype for an observatory camera obscura, that moreover enacted an epistemological shift that not only rehearsed the origins of scientific modernism but also shifted knowledge formation to a disembodied (and not just extended) eye, while stopping the movement it highlighted through traced inscription. After identifying genealogical connections between tower-based astronomy and camera obscuras, I then return to nineteenth-century discourses of towers and science. To frame the remainder of this chapter, I explore the beginnings of the term *visuality*, which Nicholas Mirzoeff attributes to writer Thomas Carlyle and his theory of Great Men. I connect it to Carlyle's earlier critique of modern science, *Sartor Resartus*, and his use of the watch-tower and the camera obscura as recurrent motifs.

Turning to towerism as tourism, I then explore the invention of the panorama by Robert Barker on Calton Hill (figure 5), which coincided with the birth of Maria Short and her mother's subsequent eviction and raid on the Gothic Tower. I read the first panorama painting as documentation of the Short family situation, which led up to those events, as well as a possible impetus or forerunner to the transformation of Calton Hill into a tourist attraction, and masculinized place and symbol of power. This panorama is also significant because it ties sublime viewpoints to aerial perspectives through an interrelated genealogy of late eighteenth-century military surveys and balloon prospects that in *Aerial Aftermaths: Wartime from Above* (2018), Caren Kaplan traces as forerunners to remote sensing—a history that I argue also includes the splendid camera obscura and its installations. The history of Calton Hill as a site that is privileged by its strategic prospects helps account for the ongoing resistance to Short's Observatory that was championed by Lord Cockburn, and it demonstrates the constructed and prescriptive nature of the site's propounded elitism. From the tourism of Calton Hill, I then identify temporary and itinerant splendid camera obscuras in Edinburgh and elsewhere—which help account for the classed nature of the controversies surrounding Short. It is notable that during the course of the nineteenth-century, seaside attractions overtook observatory towers

as the most common places to visit splendid camera obscuras. As discourses surrounding the edifying nature that optical instruments offered by their connection to science subsided, other discourses of spectatorship emerged.

The central section of this section therefore explores how images and anecdotes from the popular press associated splendid camera obscuras with criminal surveillance and voyeurism. These may be identified as alternative forms of *visuality*, which according to Nicholas Mirzoeff comprise three types of operation: 1) naming, categorizing and defining; 2) separating groups as a form of "social organization"; and 3) the application of aesthetics to make the first two operations seem "right" (*Right to Look* 3). He writes, "As the decolonial critic Franz Fanon had [sic] it, such repeated experience generates an 'aesthetic of respect for the status quo,' the aesthetics of the proper, of duty, of what is felt to be right and aesthetically pleasing, ultimately even beautiful" (Ibid). Attributing the coinage of *visuality* to Carlyle and his anti-emancipatory and hero-worshipping views, Mirzoeff identifies the "Plantation Complex" and the "Imperial Complex" as forms that supported slavery and militarism through optically-based strategies and techniques. Such concerns are not wholly alien to my subject—a Virginian slave-owning relative provided the trust that sustained Maria Short in childhood; she allegedly spent her youth in the West Indies; and war memorials literally overshadowed and competed with her Calton Hill site. However, accounts and illustrations of splendid camera obscuras more readily associate them with panopticism and the gaze. Describing visuality as "a discursive practice that has material effects," Mirzoeff identifies panopticism and the gaze as related forms (Ibid). Drawing from feminist surveillance studies, I therefore discuss how representations of sexuality and women's bodies take a central role in popular discourses of splendid cameras obscura, making them part of a longer tradition of heteronormativity that persists with current optical media technologies.

Illustrations and anecdotes however fail to capture the lived experience of seeing and using an actual device, and so the latter parts of this chapter explore potential counter-narratives. Inspired by media historians who study the panorama as affectively ambiguous, I question whether splendid camera obscuras present uniformly masterful visual experiences. Here I return to questions of embodiment and disembodiment, exploring first the competing visual

subcultures identified by Martin Jay that are potentially at play. Then I discuss the tactile and interactive qualities of a splendid camera obscura presentation, connecting my recent experiences of exhibition apparatuses with discourses of touch that were endemic to related phenomena of the nineteenth century, such as early cinema and early museums.

Finally, I conclude this chapter by discussing the ways in which Maria Short and other women who operated splendid camera obscuras in Edinburgh might have disrupted dominant strategies that separated visual, as well as lived, space through categories of class and gender. With his discussion of the panopticon and other genealogical projects by Foucault, in "What is an Apparatus?" Giorgio Agamben describes the dominant power of an apparatus or dispositif in a spatial terms—as a sacralization that takes place through the removal of something from the commons, and presents the notion of a counterapparatus as its return (17-19). Asking a similar question in "What is a Dispositif?", Gille Deleuze observes "Each apparatus has its regimen of light, the way it falls, softens and spreads, distributing the visible and the invisible, generating or eliminating an object, which cannot exist without it" (339). *Visuality*, the quality that Carlyle reserved for heroes as great men, thereby operates like an apparatus since it also works through economies of exclusion and visibility. Consequently, when Nicholas Mirzoeff describes countervisuality as the "right to look," he means that agency, resistance and opposition can be found when those who are dominated and marginalized reclaim their ability to see and decide if and how they are seen, and specifically in spaces that structurally refuse that autonomy. My research contends that a struggle of visuality, vision and visibility is central in the history of Maria Short. It uncovers women working with optical technology in a symbolically masculine site and that upends expectations given the traditionally predominance of men in histories of media and science.

As the initial resistance to and eventual eviction of Maria Short suggests, the constitution of her audience—which members of society she attracted—provoked concern from above, as well as their disregard. Four thousand signatures from the supporters of Short's Observatory meant little to the majority of the thirty-three men who ran Town Council and condoned its destruction. Nevertheless, all of the splendid camera obscuras in Edinburgh could have been

deployed as sites of potential resistance, because they operated in an economy of time as well as space. Performances of the technology by its working class and women operators provided opportunities for tactical display. In other words, its guides could vary their shows by the way they narrated and manipulated the views. There is no way of knowing how their exhibitions actually played out—for even present employees of Edinburgh's Camera Obscura work without a script and are free to improvise. Therefore, I conclude my research by using nineteenth-century illustrations, paintings and photographs to explore the sights of Edinburgh that were in view of its splendid camera obscuras. However, I pay special attention to what might normally be overlooked or devalued, and what the men who tried to stop Maria Short tried to also hide or evict. Working women and their labour appear in these pictures again and again. On the use of images to do historical work, in his preface to *Right to Look*, Nicholas Mirzoeff writes:

> When I draw inferences from enslaved, formerly enslaved, subaltern, or colonial subjects, there is often no textual support I can draw on beyond the visual image. Therefore I use the formal analysis of style composition, and inference that is commonplace within the Western canon and its hinterlands to support my arguments. I further claim that the wider historical frame I am developing here would reinforce such interpretations, just as many cultural historians have done before me. I may be wrong, of course, but the use of the visual archive to "speak" for and about subaltern histories of this kind as opposed to simply being illustrative of them, seems to me an important methodological question" (xv).

I. The Tower

Astronomical towerism

> *The Tower is an object which sees, a glance which is seen; it is a complete verb, both active and passive, in which no function, no voice (as we say in grammar with piquant ambiguity) is defective. This dialectic is not in the least banal, it makes the Tower a singular monument; for the world ordinarily produces either purely functional organisms (camera or eye) intended to see things but which then afford nothing to sight, what sees being mythically linked to what remains hidden (this is the theme of the voyeur), or else spectacles which themselves are blind and are left in the pure passivity of the visible. The Tower (and this is one of its mythic powers) transgresses this separation, this habitual divorce of seeing and being seen, it achieves a sovereign circulation between the two functions; it is a complete object which has if one may say, both sexes of sight (Barthes 283, original emphases).*

While it is possible that Maria Short originally intended to operate her Short's Observatory only long enough to establish sufficient savings for a comfortable retirement, her splendid camera

obscuras belonged to a family of relatively permanent installations found at numerous observatories installed in the first third of the nineteenth century. An *Inverness Courier* newspaper notice, published on the very day that the *The Scotsman* first reported the opposition to Maria Short's proposed plan, presents one example. Local astronomy aficionados wanted to build an observatory in Inverness (northern Scotland), and, like Short, they raised funds for its construction through the advance sale of subscriptions. To entice potential subscribers, the association compared their proposed site to the "celebrated Observatory at Greenwich," and remarked that it was "admirably adapted for a Camera Obscura" ("Proposed Astronomical Institution at Inverness," *The Inverness Courier*, 19 July 1834). Had the Inverness Astronomical Institution succeeded in the Highlands as did Short in Edinburgh, theirs would have joined the other observatory cameras obscura in Scotland such as at Mr. Morton's Observatory Tower in Kilmarnock (1818), Sir John Ross's North West Castle at Stranraer (1820-24), and the previously mentioned Dumfries and Maxwelltown Astronomical Society's Observatory (installed by Morton of Kilmarnock in 1835); as well as contemporaneous English installations like Mr. West's Clifton Observatory at Bristol (1829) and Mr. Henderson's observatory in Mount Gardens, Liverpool (1830s).[115] While the splendid camera obscura that Adie and Miller installed on Calton Hill in the Gothic Tower for the Astronomical Institution in 1814-15 predated all, the most likely progenitors of British observatory cameras had operated at Greenwich since the previous century.

Founded in 1675 as an astronomical research facility designed to support navigation and time-keeping technologies, the Royal Observatory at Greenwich had a series of camera obscuras long before its present assembly was installed in 1994 (Brennan). Like its nineteenth-century Scottish counterpart, the observatory struggled after the completion of its construction due to a "lack of money for instruments" (Donnelly 22). Nevertheless, in the 1710 account of his Greenwich tour, German scholar Zacharias Conrad van Uffenbach reported that its first Astronomer Royal, John Flamsteed demonstrated various instruments, including one of the two cameras obscura installed in the building's turrets that filled Uffenbach with "quite unscientific delight" (Brennan 16-17). Since Flamsteed equipped the Royal Observatory himself, his widow probably removed his camera obscuras along with the rest of his equipment after his death in

1719 (Ibid). Claiming all of the Observatory instruments as "her rightful property" (Ibid), Margaret Flamsteed had succeeded where Maria Short's mother, Jacobina Downie, did not. Another camera obscura however stayed at Greenwich long past its original owner's term. The fifth Astronomer Royal, Nevil Maskelyne placed another in the west turret of Flamsteed House in 1778. Although he died in 1811, his camera obscura remained there until 1840. Sightseers and artists, as well as Margaret Maskelyne, the astronomer's assistant and only child, used it for viewing and sketching scenes of the nearby Queen's House and "the great expanse of London" (Ibid 17-18).[116] With this amusement made fashionable at the kingdom's foremost research institution, savvy instrument-makers would make similar installations available for sale to the amateurs who frequented and funded astronomical observatories at home and in the colonies. One example is found in Grahamstown, South Africa where Englishman Henry Carter Galpin, established an observatory and camera obscura in 1850 at the tower house that has since become the Grahamstown Observatory Museum.[117]

Whereas in 1755, the *Dictionnaire d'architecture* by Augustin-Charles d'Avilet defines an observatory as a "bâtiment en forme de tour" (a tower-shaped building), the 1771 *Cours d'architecture* by Jacques-François Blondel describes a square building, explaining

> Un observatoire est assez ordinairement un bâtiment quarré, situé et élevé sur une éminence, et à l'extremité duquel on pratique une terrasse pour y faire les observations astronomiques. Assez souvent, sure cette terrasse, on construit un donjon pour contenir les instruments à couvert et pour y faire des expériences Physiques…Ces monuments d'utilité se construisent avec plus ou moins de grandeur et de magnificence, selon l'importance des Capitales, où les grands Princes les font élever. Quelquefois on pratique dans leur intérieur, indépendamment des grand Salles destinées pour l'Assemblée des Savants, des laboratoires, un bibliothèque, des cabinets de Physique; enfin un logement et des dépendances pour un Directeur; d'autres pour un Concierge & pour les principaux Artistes occupés à fabriquer les instruments; de grands terrasses doivent environner l'edifice; elles servent à dresser, dans la belle saison, les lunettes, qui, à raison de leur grandeur, ne pourroient pas se monter dans l'intérieur du bâtiment (qtd in Donnelly, 29).[118]

The tower top locations of nineteenth-century observatory camera obscuras therefore suggests that astronomical observation was not a priority, but rather some romantic recollection of the science as it had earlier been practiced. By the end of the eighteenth century, astronomical researchers required installations that favoured stable ground instead of upper storeys and

towers, and climate control for their increasingly sensitive instruments to ensure precise and vibration-free measurements (Ibid 56). Architects therefore designed newer observatories to have lower building profiles. With rooms for different types of instruments and activities branching off from a central room created to house a large transit telescope, the 1818 Royal Observatory of Edinburgh on Calton Hill with its neoclassical architecture became one prototypical form (Ibid 87). The roof of Short's Observatory on Calton Hill, haughtily described by Lord Cockburn as an "inverted punch-bowl" (*Journal Volume I* 62), recalls the appearance of its moveable dome, then an increasingly common observatory feature.

Maria Short had her second Short's Observatory on Castlehill constructed several stories high, even though towers had been out of fashion for serious astronomical observatories for several decades. For the "first three quarters of the eighteenth century," the tower had been their dominant form with multi-storey, purpose-built observatories replacing the upper windows, rooftop platforms, and turrets of existing buildings that stargazers in earlier times had used, when height and unobstructed views mattered more than stability (Donnelly 29). Although the Gothic Tower would sometimes be mistaken as the predecessor of the Short's Observatory Tower on Castlehill, it is significant to recall that the former was never built to house the observatory instruments. Its designer intended it to form part of a larger Romantic structure that would enclose the Observatory like a medieval fortress. In an age of canons and "longer-range artillery fire," a tower was too vulnerable to provide a military advantage (Kaplan 98). The Gothic Tower was therefore an aesthetic addition, built for the family of Thomas Short, rather than for defence or the application of the Great Telescope, which was destined for a shorter keep. The illustration of Thomas Short's Observatory on the Barker's Panorama key suggests that once James Douglas completed it in 1792, it resembled the still standing Transit House that the Astronomical Institution built to replace it in 1812 (figure 6).[119] Until air pollution from the city made observation impossible, it was its rock-solid base in combination with its elevation that made Calton Hill a good observatory site (Donnelly 89).

The nineteenth-century observatory however was more than a place for astronomical science. Aubin, Bigg and Sibum explain,

> "It was simultaneously indispensable in constructing elements of the modern western state and society–among others, European colonial expansion and the emergence of a public enthusiasm about scientific and technological developments" (2).

That was especially true of a popular observatory. A towering form may not have suited serious astronomical research, yet Short's Castlehill tower, like the splendid camera obscura towers on Calton Hill, Dumfries, Kilmarnock, Stranraer, Bristol, Grahamstown etc., performed a symbolic and ideological role. As discussed earlier, science in the early nineteenth century spoke to a public that hungered for romance and nostalgia. Astronomers developed into emergent networks of researchers that used probability and statistics as new tools that could deal with an "avalanche" of numerical data (Ibid 12-18). However, the image of the lone watchman looking through his tower-top telescope and into the starry sky persisted.

Solar camera obscuras

A tower observatory, especially an urban one, makes a good location for a splendid camera obscura because the device can capture city movements with minimal shadows and occlusions cast by surrounding architecture or heightened topography. Its exhibition provides an entertaining opportunity for instruction on the workings of an optical device through a virtual city tour, enhances the status of the venue through associations to other institutions with similar devices, and can be readily equipped by the instrument makers that supply optical devices (such as telescopes and lanterns) that might also populate the site. Yet wherefrom the association between a camera obscura and astronomical observation? The short answer is that it stems from a very old history of solar observation. For example, the English philosopher Roger Bacon, and his followers, Polish physicist Witelo or Vitello (1230-1275), Archbishop of Canterbury John Peckham (1230-1292), and Guillaume de Saint-Cloud (c1285), all recommended the use of a camera obscura for watching solar eclipses—a practice that continues today. That such devices provide safe substitutes for the practice of staring directly at the sun augmented their popularity among curious but risk-averse astronomers and opticians (Hammond 16-17). A solar eclipse figures in the earliest known image of a camera obscura. Dutch mathematician Reinerus Gemma Frisius witnessed the eclipse of January 24, 1544 at Louvain and the following year, published a drawing of the device he used to watch the event in

his treatise *De Radio Astronomica et Geometrico* (figure 2). Now think back to the first observations of the camera obscura effect outside of Asia. They appear in Aristotle's *Problemata* with questions about the shapes of solar projections through small apertures and during a solar eclipse (Forster 912b).

Yet none of these examples involve the romance of a tower and a dedicated, lone observer. Therefore, I pause to discuss the study of sunspots by Galileo Galilei, commonly attributed as "the father" of observational astronomy, modern physics, scientific method, etc., and who was imprisoned for the heresy of challenging doctrines of a geocentric universe and heavenly perfection. Romanticized as a hero and martyr by enthusiasts of nineteenth-century science, he is among the names cited in connection to James Short in the campaign to sell the Great Telescope on behalf of Maria Short ("Short's Reflector," *The Scotsman,* 16 December 1829). Moreover, the use of the camera obscura effect for astronomical research *and* inscription is present in Galileo's sunspot research. While Northern contemporaries such as Kepler and his sunspot rival Christophe Scheiner are more often associated with the use or development of the instrument, Galileo's application is recounted here because it unpacks a number of lingering questions that concern the camera obscura in general: its connection to astronomy, its inverse relation to a telescope, its association with inscription, its use for the observation of movement, and its (dis)connection to the observer's body as an epistemic condition.

Transient marks on the sun (now understood as cooler areas on the solar surface) can occasionally be seen without any instrumental aid, and their observation by astronomers in China dates back millennia (Van Helden "Galileo and Scheiner on Sunspots" 358-359). However, astronomers in the West became aware of sunspots only after the first years of the seventeenth century, when Galileo first aimed his spyglass at the sky. For even though it was a difficult and painful prospect—possible for only brief intervals—his followers used their telescopes to look at the sun, as well as the starry bodies that inhabit the night sky. Earlier Europeans did not see sunspots. Upheld as holy doctrine, Aristotelian cosmology assumed perfect heavenly bodies orbiting an imperfect Earth, so for the devout, solar irregularity was an unthinkable heresy. This belief conditioned their sight. When Europeans did see sunspots, they

ignored them or mistook them for planets or other phenomena. For example, Kepler saw a sunspot in 1607 with an "ad hoc camera obscura" and identified the spot as the transit of Mercury (Ibid 360).

Jesuit astronomer Christophe Scheiner saw sunspots through his telescope in 1610 and described his findings in anonymous letters arguing that it had "always seemed to me unfitting and, in fact unlikely, that on the most lucid body of the sun there are spots" (qtd in Van Helden, Ibid 370). Scheiner identified them instead as solar satellites. He included a series of small drawings apparently made from memory and acknowledging their inaccuracy, wrote

> They are not terribly exact, but rather hand drawn on paper as they appeared to the eye without certain and precise measurements, which could not be done sometimes due to inclement and inconstant weather, sometimes due to lack of time, and at other times due to other impediments (Ibid).

And because Scheiner did not make his observations at the same time each day, the orientations of his drawings are utterly inconsistent. Scheiner's letters were sent to Galileo, who quickly recognized their origin and responded by criticizing Scheiner's conservatism and *a priori* claims. Subsequently, Galileo described his own observations and the method he eventually used to come to completely different conclusions.

Instead of looking directly into the sun, Galileo inverted his telescope and transformed the instrument into a projector according to a technique devised by his student Benedetto Castelli—a technique that Scheiner would develop decades later with an instrument he called a *machina helioscopa* or helioscope (Kemp *Science of Art* 191-192).[120] Castelli and Galileo's method built on Kepler's work and was the first to implement sustained solar observation (by not risking blindness) and more accurate record taking. Moreover, they shifted their sight from private to public. Galileo encouraged his reader to also witness the projection of sunspots. He wrote:

> And when in a church Your Lordship sees the light of the Sun fall on the floor through some faraway broken pane of glass, hasten there with a large unfolded sheet of white paper, because you will discern spots on it (Reeves & Van Helden, 127).

Marc Welser, who had originally sent him Scheiner's letters, was the subject of Galileo's address. The German publisher was a fellow member of Accademia de Lincei (the Italian scientific academy of the "lynx-eyed) and an alumnus of the University of Padova, the school that had previously employed Galileo as a professor of mathematics. Galileo responded to Welser in Italian, rather than Latin, knowing that Welser and his fellow Italian readers would know of holes purposely placed to transform churches into camera obscuras. Such apertures, paired with meridian lines, tracked solar projections at daily intervals from solstice to solstice. Between 1575 and 1580, Dominican priest Egnazio Danti designed three such *meridiana* at Santa Maria Novella in Florence, San Petronio in Bologna and the Vatican *Torre dei Venti* or Tower of the Winds to help determine the dates for Easter, which is based on vernal equinox, and to confirm the newly reformed Gregorian calendar (Heilbron 68-75, 79).

Galileo may have deliberately referenced what were literally instruments of the Church to couch his contradictions to doctrine. He moreover argued that Aristotle would also "defer to evident experience" (Reeves & Van Helden 129). However, Galileo distinguished between Aristotle's "manifest experience" (what could be perceived without mediation) and the "present sensory observations," which included—in his time—a technological extension of the body (Ibid). Yet Galileo's mediation went beyond being a lens-based extension, or substitution, of sight. He also applied the fragmenting of time into regular intervals to observe movement too slow for human perception, and drew, literally, on his understandings of light, projection and Renaissance perspective. Galileo inverted his telescope to use it like a projector (or in other words a camera obscura) and he traced an image of the sun and its spots onto a sheet of white paper at the same time each day. To prevent distortion and keep his scale uniform, he drew a circle of the same size on each day's sheet of paper in advance to use as a registration guide.

It is tempting to liken Galileo's sunspot method to an early form of mechanical objectivity as scientific objectivity, and compare it to Talbot's explanation of photography as "impressed by nature's hand" (Daston and Galison 131). Daston and Galison would likely describe such an assessment as retrospective given their position that scientific objectivity is founded on the suppression of a modern subject, which they argue emerged in the nineteenth century, and so

long after “Archimedes, Andreas Vesalius, Galileo, Isaac Newton and a host of other luminaries” (28). Art historian Ruth Noyes observes a discursive connection between the imprint of solar image projection to “contact relics” (such as the veil of Veronica and the Shroud of Turin) as well as a visual resemblance between the sunspots etchings by Mattheus Greuter in Galileo’s sunspot treatise and contemporaneous engravings of Christ’s stigmata. Such associations would suggest the potential coexistence of Early Modern religious belief and scientific practice—a divine method of revealing blemishes on a heavenly body that, like holy wounds, did not disrupt its perfection. Perhaps in an attempt to temper the heretical nature of his findings for himself, as well as for his readers, Galileo wrote in 1611,

> I have then recognized the kindness of Nature, which thousands and thousands of years ago put in place the means of having some knowledge of these spots and through them, certain great consequences. For without other instruments, the image of the Sun and the spots is carried over great distances through each small aperture traversed by the solar rays, and imprinted on any surface held up to it (Reeves & Van Helden 127).

Whereas optically-made or inspired imagery such as photography and painting is based on arrested movement—accomplished by a short exposure time or a subject obliged to hold still, Galileo’s tracings revealed to him and to his audience change and motion that was otherwise imperceptible and un-representable. His sunspot drawings reveal individual spots shifting in size and shape, and then foreshortening at the edge of the solar disk because they are sequential images. Unlike other camera obscura still pictures, they meet the conditions required to produce an animated effect and enable time-based analysis. The changes over time revealed by his image series led to and supported Galileo’s theory that the sunspots were in flux and very close to, or part of, the sun, and not the shadows of solid bodies in transit or orbit. That an inconsistent surface or layer surrounded the sun, and that the sun was possibly spinning, challenged the doctrine of an immutable heavenly body and gave credence to a Copernican heliocentric universe. This would ultimately result in the inquisition and imprisonment of Galileo, and banning of his works, as well as his Romantic characterization as a hero of science.

Galileo’s tracing of the sun as a scientific method may be described as an early pre-cursor to rotoscopy (the frame by frame tracing of stopped moving imagery) and time-lapse

photography. While these techniques are frequently associated with cinema and animation, they connect to a longer history of astronomical analysis. After his sunspot drawings, Galileo abandoned the use of visual language, which he had also adopted in his first astronomical treatise *Siderius Nuncius* (Starry Messenger 1610), in favour of dialogical arguments (Winkler and Van Helden).[121] Astronomers would not revisit the application of sequential illustrations until decades later (Ibid). Nevertheless, science historians Eileen Reeves and Albert Van Helden describe the early shift by Galileo from drawing after direct observation to tracing projections as "the transition from opportunity-driven qualitative observation to systematic (and quantitative) research on sunspots" (82). As the epistemological separation of vision from body, it furthermore emphasizes physical safety as a primary motivation—an obvious factor that is frequently omitted by discourses that connect the camera obscura to disembodied knowledge and inscriptive verisimilitude.

Visuality

In the preface to the 1988 book, *Vision and Visuality*, its editor Hal Foster explains that "vision suggests sight as a physical operation, and visuality sight as a social fact" and while the two are not opposed, "the difference between the terms signals a difference within the visual—between the mechanism of sight and its historical techniques, between the datum of vision and its discursive techniques" (ix). Nicholas Mirzoeff describes Foster's collection, and the symposium that it emerged from, as a project that "in general sought to 'historicize modern vision'" ("On Visuality" 55). While discussions by participants Rosalind Krauss, Norman Bryson and Jacqueline Rose leaned towards twentieth-century phenomena, the first two contributions are significant to this thesis. Crary introduced his aforementioned concept of successive epistemes separated by rupture, while Martin Jay theorized a coexistence of competing visual subcultures within successive scopic regimes.

Jay identifies three potentially hegemonic examples of visual subcultures that operate within a given scopic regime of modernity. He lists them as 1) Cartesian perspectivalism, which follows quattrocento image construction and privileges a "monocular subject"; 2) the art of describing (after Svetlana Alpers), which is "based on a mapping impulse;" and 3) baroque vision (after

Christine Buci-Glucksmann) which operating as an "ocular madness" is best able to challenge the first ("Scopic Regimes" 3-20). The relation between the theories by Crary and Jay is somewhat complicated since their arguments are similar and reference each other in their followup texts—Crary's *Techniques of the Observer,* and Jay's *Downcast Eyes* (1993). Jay aligns Crary's camera obscura model with Cartesian perspectivalism (Foster, 45; Jay *Downcast Eyes* 69n153). And while Crary acknowledges the "disruptive possibilities of anamorphosis" (*Techniques* 33), which Jay associates with baroque vision, Crary problematizes aspects of Alper's theory. He challenges Alper's alignment of the camera obscura with Northern visuality and a narrative of continuous development that links Dutch painting to photography (Ibid 34-36). Crary will always haunt this thesis and I will return to Jay's notion of visual subcultures, but here I pursue the concept of visuality as developed by Nicolas Mirzoeff and its connection to towers, the camera obscura and nineteenth century Scotland.

Building on Foster's project, Mirzoeff explores how "visuality emerged into Western discourse at a specific and charged moment of modernity as a conservative critique of Enlightenment and its emancipations" ("On Visuality" 55). He identifies two modes of visuality, following the model by Dipesh Chakrabarty that identifies two modes of history: History 1, which is "predicated by capitalism for itself 'as a precondition' to its own existence"; and History 2, which is precluded since it "cannot be written into the history of capital even as prefiguration" (*Right to Look* 22). Visuality 1 includes forms that work toward a "coherent and intelligible picture of modernity" and its "logical endpoint" is Guy Debord's notion of the spectacle as "capital accumulation to the point where it becomes an image" (Ibid 23). Mirzoeff identifies photography, cinema and scientific systems of knowledge that operate on docile bodies as part of Visuality 1, and so it would probably also incorporate both Cartesian perspectivalism and the art of describing as impulses towards narration and mapping, which tend towards coherent understanding even if they use different methods. Visuality 2 "figured as the barbaric, uncivilized, or in the modern period, the 'primitive'" is an irrational form (Ibid 24). Therefore, it could be akin to baroque vision, and its applications likewise range from oppositional to neutral to authoritative. Since Visuality 2 is open to appropriation, not all of its forms are what Mirzoeff refers to as "countervisuality"—"the attempt to reconfigure visuality as a whole" (Ibid).

"Visuality was named as such in English by the historian Thomas Carlyle (1795-1881) to refer to what he called the tradition of heroic leadership, which visualizes history to sustain autocratic authority" (Ibid 3).[122] Mirzoeff refers to Carlyle's 1840 lecture series, afterwards published as *Heroes, Hero-Worship and the Heroic in History*, and commonly cited as the first articulation of the Great Man Theory of History. Carlyle averred "No great man lives in vain. The history of the world is but the biography of great men" (*On Heroes* 31). Previous histories may have attended to the lives of monarchs and gods, but for Carlyle, greatness was not a birthright.[123] Instead, heroes were those who wielded the unique power of visualization. In other words—big picture thinking—although of a sort available only to certain kinds of white men.

Is it presumptuous to imagine that, before his chronicling and worshipping of heroes, visualization was Carlyle's primary aspiration? In assessing two unpublished and incomplete Carlyle 1852 manuscripts alongside his *Sartor Resartus*, Murray Baumgarten asserts "Through the use of the notion of spiritual optics, Carlyle strives to be the spiritual Newton and psychological Galileo of his age" (506). Recall that in the years leading up to his *Heroes* lectures, the writer, at the time most identified with his promotion of German Romanticism, had made a sorry bid to become Edinburgh's first full-time observer—all the while deploring the emergent computational tendencies of scientific research that were especially significant to astronomy. He parodied the mechanical quality of modern science in his novel *Sartor Resartus*, first published in serial form around the same time as his failed application, and then permanently departed from Scotland.[124] *Sartor Resartus* attempts to describe the career of the fictional Professor Diogenes Teufelsdröckh ["God-born Devil's Shit" (Secord, *Visions* 205)] and his Philosophy of Clothes. Yet the purposely opaque and self-reflective structure of the text confounds any straightforward reading. The book nevertheless found an audience in the 1840s, including a number of influential scientific naturalists of the subsequent generation such as biologist/Darwinist Thomas Henry Huxley (1825-1895), physicist John Tyndall (1820-1893), polymath/eugenicist Francis Galton (1822-1911), and scientist/political theorist Herbert Spencer (1820-1903), as well as the historian/biographer Leslie Stephen (1832-1904), the father of Virginia Woolf and Vanessa Bell (Frank M. Turner). As James Secord explains,

> They saw his preference for a dynamic science over a mechanical one as a prophetic insight into the direction of science itself. The new stress on the biographical chapters became crucial here, as the doubts, tragedies and the ultimate resolution in the life of the German professor at Weissnichtwo became a way of working through private crises of faith and uncertain scientific careers (*Visions of Science*, 234).

Carlyle rehearses the word "visualized" for the first time, as a despairing Teufelsdröckh wonders, "Who am I; what is this ME? A Voice, a Motion, an Appearance;—some embodied, visualized Idea in the Eternal Mind? *Cogito ergo sum*. Alas, poor Cogitator, this takes us but a little way" (*Sartor* 41, underlined emphasis added). Yet as his doubting hero's "Everlasting No" (Book II, Chapter VII) transforms into an "Everlasting Yea" (Book II, Chapter IX), Carlyle shows that "scientific enquiry could be a high calling" (Secord *Visions of Science* 234). Secord explains "*Sartor* redefined the place from which true knowledge begins as the 'scientific watch-tower'" and he concludes, "The new place of science in *Sartor* is a spiritual observatory" (Ibid 235).

Carlyle's description of *Sartor's* watch-tower reads like a vision of Short's Observatory on Castlehill, although the text predates the construction by twenty years.

> It was the attic floor of the highest house in the Wahngasse [Delusion Lane]; and might truly be called the pinnacle of Weissnichtwo [Know-not-where], for it rose sheer up above the contiguous roofs, themselves rising from elevated ground. Moreover, with its windows it looked towards all the four Orte [compass points] or as the Scotch say, and we ought to say, Airts: the sitting room itself commanded three; another came to view in the Schlafgemach (bedroom) at the opposite end; to say nothing of the kitchen, which offered two, as it were, duplicates, showing nothing new. So that it was in fact the speculum [mirror] or watch-tower of Teufelsdröckh; wherefrom, sitting at ease he might see the whole life-circulation of that considerable City; the streets and lanes of which, with all their doing and driving (Thun und Treiben), were for the most part visible there (*Sartor Resartus* 15 original emphases; bracketed translations of German from Jessop 121).

The connection in Carlyle between towers, camera obscuras, and visuality is therefore remarkable.[125] Nevertheless, the simple fact that the first instalment of *Sartor* appeared in 1833 and Short's Observatory had not yet opened (even on Calton Hill) confounds identifications of the "considerable City" that is Weissnichtwo (Know-not-where) as Edinburgh, and the Wahngasse (Delusion Lane) as the Royal Mile that runs between Edinburgh Castle and Holyrood Palace. It is also notable that the Short's Observatory Castlehill tower overlooks the grounds of Edinburgh Castle as well as the Royal Mile, and the view from Teufelsdröckh's

watch-tower likewise includes “the Palace esplanade” (*Sartor* 15). Given his 1834 move to London happening before Maria’s first opening, whether Carlyle visited either or both of her sites on return visits is no more verifiable than his novel having influence on the choice of her second location.[126] Yet Carlyle was probably familiar with the camera obscura of the Astronomical Institution, potentially having gained entry as a “favourite pupil” of his University of Edinburgh mathematics professor John Leslie (Masson 261).

Speculations that Carlyle had visited a Calton Hill camera obscura also feature in a 1996 article about the *Sartor Resartus* watchtower by Ralph Jessop. Jessop argues that Teufelsdröckh’s dwelling might very well be “some kind of observatory tower housing a camera obscura, and this as symbolising Teufelsdröckh’s mind” but he assesses that theory as ultimately “defeated” by contradictory descriptions and appropriately so, given Carlyle’s anti-materialist insistence on the mysterious (119). Jessop perceives a metaphorical contradiction in the description of Teufelsdröckh’s apartment as a “speculum or watch-tower” (127). While he notes that both the camera obscura and the mind both function as inlets and spaces of reflection, Jessop ignores any technical connections (128). A speculum, which James Short was renowned for polishing to perfection, is the primary optical component of reflecting (also known as Gregorian and Newtonian) telescopes, of which the Great Telescope was a prime example. Carlyle therefore could have referred to a telescope in an observatory tower. Additionally, reflex box cameras and splendid walk-in devices are among the camera obscura types that use mirrors along with lenses to reflect and project light so there is no reason to disqualify a camera obscura either, except that Teufelsdröckh’s six windows would require blacking out.[127]

In *Heroes*, Carlyle introduces his notion of a “great man” by writing,

> We cannot look, however imperfectly, upon a great man, without gaining something by him. He is the living light-fountain, which it is good and pleasant to be near. The light which enlightens, which has enlightened the darkness of the world; and this is not as a kindled lamp only, but rather as a natural luminary shining by the gift of heaven; a flowing light-fountain, as I say, of native original insight, of manhood and heroic nobleness; in whose radiance all souls feel that it is well with them (6).

That imagery also recollects a camera obscura, with sunlight projecting into darkness and creating a celestial point of view. Carlyle would have been writing his history of *The French Revolution* (1837) when the review of the Dumfries and Maxwellian Astronomical Astronomical Society camera obscura appeared in the local paper. Recall that the reviewer for the *Dumfries Courier* noted,

> A boy who was present whispered to someone that the figures came and went on the object table, reminded him of Bonaparte's soldiers crossing the Alps in Mr. Thoidon's mechanical theatre; and the remark was perfectly natural and just. (3 August 1836).

How coincidental is that child's observation, and what is the likelihood that Carlyle was aware of the resemblance between views in the Dumfries camera obscura and a Napoleonic battlefield? Both Carlyle and his wife Jane Baillie Welsh were from the Dumfries area, and lived about 20 miles away from the observatory site at the Welsh family's Craigenputtock property from 1828-1835, when Carlyle was writing *Sartor Resartus* and the society was planning their exhibition. Did a relative or neighbour forward the camera obscura review to the Carlyles' new home in London?

As "the archetype of the Modern Hero for Carlyle," Napoleon Bonaparte had an aptitude for "military visualization— a combination of "information supplied by subalterns…and his own ideas, intuitions and images" (Mirzoeff *Right to Look* 12-13). Carlyle adapted and generalized his understanding of *visuality* from Prussian war theorist Karl von Clausewitz (Ibid 124-25), who himself extended the older military concept of *coup d'oeil* (a striking glance) to include a "commander's 'inward eye,'" (Kaplan 55). While *coup d'oeil* is a significant term that I return to below, what is notable here is Mirzoeff's observation that Carlyle's deeply racist stance on slavery and its abolition infected his descriptions of popular revolution (*Right to Look* 13). Mirzoeff explains that in *The French Revolution*, Carlyle asserts that "all revolution from below is 'black'," and that "[t]his 'blackness' was the very antithesis of heroism that Napoleon finally negated" (Ibid). The camera obscura imagery—the light in darkness—when applied by Carlyle is therefore a racialized pictured of a dominant view from above. The hero as the "living light-fountain […] which has enlightened the darkness of the world" is literally light as White—and white, like an ivory tower. The phallic qualities of the fountain and the tower are moreover

unmistakeable. Mirzoeff notes, “Great men are great by their ability to visualize History while being in the midst of it, making them into Heroes. It is a given that they are men, or masculine, gendering all countervisuality as feminine” (Ibid 131). Countervisuality is therefore the tool of a willful woman.

The influence of Carlyle on nineteenth-century patriarchal politics and thought was wide-ranging and impactful in its support of colonialism and imperialism. Along with his essays against Chartism and Abolition in the proceeding decades, “Carlyle’s work on Heroism was well received and his influence continued to grow, giving him a ‘long (and largely unremarked) legacy in reactionary thought’” (Ibid 143). His celebration of heroic white masculinity is therefore crucial to understanding a discursive and ideological notion of a camera obscura beyond theoretical understandings of vision. It also supports the idea that alternative applications of camera obscuras, by those who were not white or not male, could be considered willful and oppositional, which I will explore alongside Mirzoeff’s concept of feminine countervisualty. However, in the following section I pursue the observation that Teufelsdröckh’s view was “Perhaps reminiscent of the view of Edinburgh from the Calton Hill,” (J.A.S. Barrett, qtd in Jessop, 126). And so this discussion now shifts from towerism to tourism, with a *retour* to Calton Hill.

II. The Tour

The Panoramic Construction of Calton Hill

> [Panoramas] suggest modernist architectural space, a kind of ornamental modern architecture. There were not simply movies, but scripts, phantasmatic skyscrapers, Eiffel Towers, and Ferris Wheels before the fact (Klein 181)

To stand on Calton Hill and to view the castle city of Edinburgh, the port of Leith, and beyond, is to appreciate its merits as a lookout point. Like numerous painters, such as Mary Stewart (Lady Elton), David Octavius Hill, Alexander Nasmyth and J.M.W. Turner, members of the Astronomical Institution would have recognized the value of their vantage when they installed the first splendid cameras obscura on Calton Hill in the Gothic Tower. Also known as the Old

Observatory House, the former home of the Shorts still watches over the magnificent vista of the castle city—Arthur's Seat, Old Town, New Town, the Firth of Forth and the port of Leith below.[128] Imagining its outlook two centuries ago is made easier by the "View of Edinburgh and the Surrounding County from the Calton Hill," six hand-coloured aquatints made by John Wells after the first painting in the round by the inventor of the panorama Irishman Robert Barker (1739-1806) between 1787 and 1788 (figure 5). The panoramic view is remarkable for what it also shows of Calton Hill, especially since it documents the summit during the final year of Thomas Short's life and before the surge of building and tourism on the hill that began shortly after.

In the section of Barker's image that represents the view to the east, the chimney of the Gothic Tower dominates the foreground and behind it, there sits the octagonal foundation of Thomas Short's observatory. Surrounded by walls, the complex comprises a pattern of walkways, ornamental shrubs and a giant orrery of the solar system, while towards the back (to the left of the chimney), parallel rows of a walled off kitchen garden indicate private and domestic life. Panorama historian Denise Blake Oleksijczuk describes Barker's depiction of the observatory as "one of the signs of Enlightenment science for which Edinburgh was a world center" (34). Yet rather than reading its image as scientific achievement, it could also be seen as a record of the long unfinished and unfunded site, and as such, an illustration of the basis for Town Council's eventual (albeit temporary) acquiescence to Maria Short.[129] It also documents the life, the view, and the promises they offered, which her mother would risk so much to retain. The panorama may even represent Jacobina and other members of her household. A stylish woman walks with a small child along the path behind the Gothic Tower, and two gentlemen stand together on the observatory grounds with one, possibly Thomas, pointing to either the giant orrery (a garden model of the solar system) or the incomplete construction behind it. In the background, a man pushes some kind of rolling device perhaps levelling the walkway, while a woman watches over laundry laid out on the ground of a lower slope to the right. Elsewhere on the summit, livestock rest and graze, a half dozen adults and children gaze out in various directions, while another handful stroll up or down the hill.

Barker composed this, his very first panorama, after preparatory sketches made from the roof of the Gothic Tower by his twelve-year-old son Henry Aston Barker (1774-1856). It is possible that the boy used a portable camera obscura to make his drawings since British surveyors and architects, as well as artists and travellers, are known to have used such devices to rapidly transcribe impressions of built and natural environments. In their history of early Scottish photography, Alison Morrison-Low and Sara Stevenson cite the use of cameras obscura by Paul Sandby (1731-1809) to document the Scottish landscape in the wake of the 1745 Jacobite Rebellion and by Scottish explorer James Bruce (1730-94) during his time in Abyssinia for the purpose of accurately recording his observations and discoveries (4-5). The use of optical drawing aids for military surveys and colonial expeditions may originate with early modern practices, and especially ones from Northern Europe. Caplan observes that, "During the European Renaissance, influenced by the newly translated works of Ptolemy, a descriptive mode of mapping, chorography, became a widely practiced way to promote a kingdom's interest in coming to know its discrete regions" (44). On describing the portable tent camera obscura of astronomer Johannes Kepler (1571-1630) in a letter to Francis Bacon (1561-1626), the diplomat and traveller, Sir Henry Wotton (1568-1639) observed "there might be good use made of it for Chorography" (qtd in Hammond 26). Therefore, speculation that John Slezer (d.1717), a British army man of Germanic origin, who travelled through Scotland in the 1670s as Surveyor of his Majesties Stores and Magazines and drew the first series of Scottish landscapes, may have also used a similar device is unsurprising.[130]

"The North Prospect of the City of Edenburgh [sic] viewed from the Calton Hill" (figure 4) is a foldout illustration that first appeared in the second edition of *Theatrum Scotiae* (1719), which Slezer published as a printed set of engraved Scottish views for sale to a general public interested in learning more about England's northern conquest. Depicting a relatively wide angle of view, the image illustrates a distant, densely clustered mass of buildings lining the one-mile ridge (the Royal Mile) that extends from Edinburgh Castle to Holyrood Palace, with shepherds and grazing livestock in the foreground on Calton Hill. As the same view, redrawn and extended full circle, Barker's panorama depicts the changes implemented during the second half of the eighteenth century to accommodate the surge of urbanization—notably, the

orderly development of New Town and the filling of the Nor Loch, the marsh that had previously bounded the northern edge of the old and jumbled castle city. In contrast to Slezer's image of a distant, vertically-arranged fortress settlement constrained by its strategically positioning, Barker presents a view of a modern and expansive Edinburgh that surrounds the summit, which he exhibited it in a modern and expansive way—a distant painting presented in the round to viewers positioned on a high, central platform. It is notable that Barker did not call his invention a "panorama," but rather *la nature à coup d'oeil*, thus drawing on the contemporaneous term for battlefield visualization and its militaristic point of view (Kaplan 104).

On discussing the creation of preparatory drawings for the Calton Hill panorama, the younger Barker would years later recall "I have no idea now what sort of drawing was made by me—no doubt, it was wretchedly bad" (*Art Journal* 46)." Sara Stevenson observes that "Barker's patent claim gave weight to the mechanical role of the transcriber" and suggests that having a boy make the original sketches had to do with the desire to produce an "unmediated view" where no presence of artistic talent or skill could be perceived (217). As Caren Kaplan notes, Sandby would have also been a boy when the British Board of Ordnance trained the future landscape artist to "think more mathematically than imaginatively" (57). These notions also give credence to their uses of technological drawing aids, and opens the possibility that in Barker's case, a camera obscura looked out from the roof of the Gothic Tower long before its takeover by the Astronomical Institution. That Thomas Short was living there at the time would make access to optical devices relatively easy.[131] Nevertheless, a camera obscura for drawing, if indeed the boy had used one, would fail to resolve the primary challenge faced by his father. Like Slezer, whose composite images achieve varying levels of success (for example, there are curious distortions in his view of the University of Glasgow), Barker needed to combine multiple perspectives into one, meaning any drawings that Henry produced required considerable adaptation and intervention.

Barker installed his son on the roof of the Gothic Tower sometime between 1787 and 1788, and given that, in Henry's own words, he "worked very slowly" (*Art Journal* 46), it is possible that

the drama that would culminate in Jacobina Downie's raid on Calton Hill unfolded as he worked, in the floors beneath him. According to the account by Elizabeth Beverly regarding the difficulties experienced at the Observatory (Appendix A), Thomas would have been in decline, and as other records suggest, there were three children (Joanne, Margaret and James) and Jacobina was or would soon be pregnant with Maria. Meanwhile the family physician, the amorous apothecary John McFadzen, would be attending to all of them. Aside from house calls and social visits, it is likely that the Shorts were mostly alone in their occupation of Calton Hill, since they had no neighbours. Henry must have had at least some interaction with the family, as surely a boy on the roof drew at the very least, interest from the Short children. Moreover, it is possible that the Barkers and the Shorts were previously acquainted. As a portraitist and miniature painter, Barker shared the same occupation as the Short family friend, John Caldwall (1739-1820), who had witnessed the birth of Joanna and is remembered in his obituary for talents in both mathematics and drawing, and for having a "long list of friends…many distinguished by both birth and talent."[132] Given the possibility that Barker and Caldwall circulated in similarly broad, if not overlapping, circles, it is possible that Barker selected his site on Calton Hill also because he already knew Thomas and Jacobina. As someone who had spent time in a debtors' prison (Oleksijczuk 27), Barker may have even sympathized with their financial plight. However, if Barker or his son had some awareness of ongoing tensions in the Gothic Tower, then the image of the unfinished observatory and the gentleman pointing to it are the only clues they left.

The completed *coup d'oeil* premiered at the Archer's Hall in Old Town on January 31, 1788; its reopening in the New Town Assembly Rooms on George Street on March 6 preceded the death of Thomas Short by just one week; and the Barkers' move to London in November for a two-year run coincided with Jacobina's departure from, and raid on, Calton Hill (Ibid 26). The panorama and Maria Short therefore have provenance in common. They share the same year and place of birth, and both combined optical technology and popular spectacle by bringing the hilltop vista of their origin from outside to inside. At least two sets of significant differences nevertheless distinguish the panorama and the splendid camera obscura. Obviously, they have very different configurations: a panorama is an unreachable *still* painted image that surrounds

its viewers to give an illusion of life-size form, whereas the camera obscura presents a touchable *moving* optical image as a miniaturized representation. The geographic relation between content and site marks another distinction. The image projected by a camera obscura is never severed from its time and location—its picture being necessarily live and transmitted over a relatively short distance. The view inside the panorama on the other hand, need not have anything to do with its outside view. Even if, as others have explored, its sensational effects and cultural meanings are situated and subjective—its picture, being immutable, is moveable.

Barker transported the view from Calton Hill, taking it indoors and down the hill, enabling his audiences to see its prospects without having to make the inconvenient journey to its summit. The figures in his panorama appear untroubled by the terrain or the climb, even though the only way up Calton Hill at the time was along what Lord Cockburn described as a "steep, narrow, stinking spiral street" (228). In a lesser known origin story, Barker imagines "a free outlook in all directions," while "incarcerated for unpaid debts in a circular cell" (Kaplan 111). In the more common one, his idea for the panorama came to him on a stroll on Calton Hill with his daughter. In that version, the challenging assent may have provided as much impetus for his project as the view. For the panorama, always depicted from an elevated point is not just virtual travel, it is a virtual experience of *difficult* travel. Norman Klein calls the panorama "armchair tourism" and describes how later installations would offer "imperialist adventures" without the "sweating" or "risk of malaria"(180). Kaplan likens the view of a panorama to a balloon prospect, and specifically the "first moments of the launch into the atmosphere"(108)—a sensation available to few British people, despite their nation being gripped by the balloonomania that emerged out of France. Recall that not even the fictionalized version of Jacobina Downie, imagined by *The Star* in London, could travel in Lunardi's balloon (6 December 1788). Her desire to soar through the skies was allegedly denied by a late-stage pregnancy that resulted from an affair with a man that painted miniatures.

Based on presentation guides produced for its premiere, Denise Blake Oleksijczuk argues that Barker's Calton Hill *coup d'oeil* may have provided a sympathetic memorial to the 1745 Jacobite

Rebellion to some of its viewers in Edinburgh (40-46), whereas Londoners might have viewed it as evidence of the benefits of Scotland's union with England (47). Regardless of its potential to articulate local ideologies, spectators in each city could experience the view from Calton Hill while avoiding the climb and the possibility of inclement weather. And for those unable to attend an exhibition, word of mouth and assorted ephemera offered his second-hand experience of Calton Hill, third-hand. The publicity, the press and the printed reproductions that promoted the painting's outstanding success would have also promulgated its view—ironically, heralding the increasing cachet of Calton Hill as a destination for sightseers. As his own image suggests, not many people were making the climb before his first presentation, but in the decades that followed, the summit would become a site of increased building and attraction.

Sara Stevenson explains, "Calton Hill is a place where people congregate and events happen; it is not a simple viewing platform, but a stage" (214). However, both stage and viewing platform are constructions, and evidence suggests that these constructions gained momentum in the final decade of the eighteenth century, after the creation of Barker's first panorama, and alongside the completion of the Edinburgh's first observatory by James Douglas (1792) and its first Bridewell (1791-1796)—the latter having a "Panoptical design" by architect Robert Adam, who corresponded with Jeremy Bentham as he developed its semi-circular layout which radiated from a central tower (Markus 72-82). These interrelated technologies of disciplinary looking—one promoting scientific study and the other touting Panoptic reform—would meet the eye of the tourist on Calton Hill, earlier expressed by Barker as a *coup d'oeil* that, translated from an all-seeing view of a battlefield into a popular spectacle, would progress into panoramas that increasingly displayed sights and sites of imperialism and war. Observatory science, the reformatory prison and tourism (real life and virtual) all participated as forms of an ocularcentric discourse that emerged from and alongside, militarized aerial viewpoints and sublime balloon prospects, which gained popularity in the latter part of the eighteenth century.

Tourism and the Acropolis

Although Calton Hill became a tourist destination, it took some time before making regular appearances in the travel accounts and guides that, in the latter part of the eighteenth century, shifted the traditional Grand Tour taken by the English from the Revolutionary war-torn continent northward into Scotland. For example, neither James Boswell (1740-1795) nor Samuel Johnson (1709-1784) make any mention in their individual accounts of their shared 1773 tour of Scotland, and it is omitted from the 1789 publication of *Observations on the Highlands of Scotland* by picturesque traveller William Gilpin (1724-1804).[133] Until the mid-eighteenth century, English travelers had little use for mountains, which they pictured as "landscapes of 'disgust and damnation,' as protuberances that 'disfigure the earth,' linked through sexual associations to a fear, in particular, of aging female bodies" (Caplan 62). Such abject associations with mountains, and the Scottish Highlands in particular, could help explain why recommendations that visitors climb Arthur's Seat, or for that matter Calton Hill, are likewise absent from the 1794 *Traveller's Companion to the City of Edinburgh*. The guidebook does however, mention Calton Hill twice, but as a sight to be seen not climbed. It recounts the 1788 "attack on the Observatory" and the subsequent punishment allotted to two of the ten unnamed assailants (56-57), and describes the Bridewell, then newly built on the "fourth declivity," as "an object highly interesting to the feelings of humanity, and absolutely requisite for the good order of society" (52). A reader of the guide could therefore look up at the hill, tremble at the unruliness of Jacobina Downie's night time raid, and perhaps find comfort in the punishment and potential reformation at work inside the modern prison. The only seeing eyes it situated on Calton Hill were either looking into the sky from the observatory that James Douglas completed, or monitoring inmates at the panoptic correction facility.

Even though a difficult ascent might challenge casual sightseers wanting to see Barker's view for themselves, The *New Guide to the City of Edinburgh* from 1797, may be the earliest practical guide to encourage the trek. Suggesting that a mobile spectator could best overcome the visual obstructions inherent to the irregular topology and vertical orientation of buildings in the oldest parts of the craggy city, the penultimate section of the book includes descriptions of two hilltop walks. Before advising the sightseer to climb Arthur's Seat for its "grand and extensive" view, the guide states

> The Walk around Calton Hill—Commands a very interesting prospect […] It is somewhat unlucky that no means can be readily employed to render the Calton Hill more easily accessible to the Stranger and to the Citizen. Should the views of the scenery tire the beholder, he may ascend to the Observatory, and through the telescopes of Short, raise his contemplation to the stars; or turn his steps to the west corner of the hill, and there meditate among the tombs or he may turn from a short way eastward, and at the New Bridewell, sigh over a monument of wickedness and misery of human nature, and of the evils which man in society is compelled to inflict upon man (122-23).

Travel writer Sarah Murray (1744-1811) penned an enthusiastic description in her 1799 *Companion and Useful Guide to the Beauties of Scotland*.

> There scarcely can be a finer view than that from the Calton Hill, which rises from the town of Edinburgh. I have never seen the view of Naples, to its Bay, but I am told, those who have seen both, are in doubt to which of the two to give preference. On gaining the summit of Calton Hill, a grand view presents itself to the North, over the flat ground of a mile and a half, between Edinburgh and Leith, enriched by villas, gardens, woods, and fine land; over which is seen the town of Leith; its road, crowded with ships, and the Forth, like an arm of the sea, seven miles broad, flowing from Stirling to the German ocean; with the mountains of Fife closing the scene. To the east is the course of the river, with islands adding to its beauty; and a rich vale towards Musselburgh, Preston Pans, and Haddington, bounded by the great rock in the sea, called the Bass. To the south-east, Arthur's Seat and Salisbury Crags rise boldly, sheltering the palace of Holyrood house. On the west is the town, the castle, and a rich vale beyond, bounded by gigantic mountains; and the Pentland Hills finely close the scene to the south-west. Such is the charming prospect from Calton Hill (qtd in Stevenson, "The Hill View, "214).

As travel guides increasingly promoted Calton Hill, Sara Stevenson contends that as "It became a focus of Romance"—looking *from* it "became a participatory or performance art" where "thoughtful viewers" could achieve "a heightened sensitivity" (Ibid 214-15). This form of looking, enhanced by the poetically volatile forces of Scottish weather, would come together with Romantic science, painting, photography and the splendid cameras obscura of Calton Hill (see Morrison-Low and Stevenson 3-21). Thomas Carlyle, who spent much of his time in Edinburgh as a student and then as a struggling writer broodily walking the city with German Romanticism to occupy his mind, would no doubt approve (Masson 274-284).

In the decade that followed Barker's display, a series of city guides therefore facilitated the transformation of Calton Hill into a romantic and picturesque site, and soon after, that construction would translate from discursive to material form. A series of monuments and

buildings appeared on Calton in the neo-Classical style that earned Edinburgh the nickname Modern Athens. While a shortage of funds permanently arrested its reconstruction as the Parthenon, the National Monument (1826) which commemorates Scottish soldiers of the Napoleonic wars would join the Nelson's Monument (1807-1815) erected to celebrate Horatio Nelson as the victor of the 1805 Battle of Trafalgar, alongside tributes to heroes of the Scottish Enlightenment: the John Playfair Monument (1825-1826), the Dugald Stewart Monument (1830-1832) and the Robert Burns Monument (1831). New buildings included the new Observatory (1818), the Royal High School (1826-1829), and the upper middle-class residential terraces that skirt the eastern side of the hill.

The summit of Calton Hill became a masculinized site for celebrating the great deeds of *men.* Despite being open to anyone who was physically able to make the ascent (and corseting would make that no easy feat), sightseeing by unaccompanied women was dissuaded. Travel writer Sarah Murray explains at the end of her description, "But as that hill is common, daily, and nightly lounge of all the vagabonds and *loose tribe* of the town, the walk over it must be taken with a gentleman in company, else *women of decency* will be insulted (qtd in Stevenson, "The Hill View," 214, emphasis added). In the early decades of the nineteenth century, members of that "loose tribe"—the local working class who Murray racializes as threats to "women of decency"—would not merely occupy Calton Hill, they would find occupation there through its material construction.

Extreme poverty in the rapidly expanding city contributed to public works on Calton Hill. Cockburn recalls that towards the end of the second decade of the nineteenth century, "There were probably never so many people destitute at one time in Edinburgh. The distress was in less severity that in 1797; but the population having increased it was greater in extent" (*Memorials* 293-94).[134] As the 1845 Statistical Account explains,

> In the year 1816, when, in consequence of the depressed state of trade, and the high price of provisions, a great proportion of the labouring poor were in depressed circumstances, a subscription was raised, and the able bodied were employed in forming walks around the hill, and around Salisbury Crags (Volume 1 654).

Yet in recognizing the "permanent good obtained from the labour of the relieved" Cockburn remarks "Until then these two noble terraces were enjoyable only by the young and the active" (*Memorials* 294). A report on the relief efforts delivered in June 1817 states,

> Without stopping to notice the minor works in which the people were employed, the Committee may mention, with pride and satisfaction, the execution of the Promenade round the Calton Hill, which has opened up new features in one of the most splendid landscapes which any capital in Europe can boast of; and which will remain, to future ages, as a recorded monument at once of the taste and the charity of the inhabitants of Edinburgh (Report of the Committee 6).

The public works followed recommendations set forth by William Stark in a pamphlet that was posthumously published in 1814 but nevertheless impacted the character of Calton Hill. Stark's report derived from his adjudication of proposals for the planning of the hill and the area north of it, which had been solicited for a competition that ended in January 1813. Stark's death in October of that year prevented his report's completion. Cockburn, who described him as the "best modern architect that Scotland had produced" recorded a comment by Sir Walter Scott that with Stark "more genius had died that is left behind among the collected universality of Scottish architects" (*Memorials* 278-179). It is unsurprising then that Stark's report was "the most influential, both in the decision not to effect any of the submitted plans and in the manner in which it was finally agreed to layout the site" (Reed 137). Suggesting that the site's beauty would best be enhanced by respecting its natural features rather than imposing "right lines and mathemathical curves" (Stark 18), Stark recommended that building be limited on the summit (Ibid), and according to the "Postscript by a Friend," he had also recommended the installation of a "public walks, free from the noise and the dangers of horses and carriages" (20).

That "Friend" also claimed that Stark "intended to earnestly recommend connecting the Calton Hill, with Prince's Street by means of a bridge" (Ibid 19), and so it was not just the appearance of the summit that the architect influenced, but also its accessibility. Peter Reed suggests that the publication of the pamphlet by "a Friend" may indicate "behind the scenes" manipulations and wonders whether it was Whiggish intervention (in effect, Cockburn and associates) at play

(137). He notes that William Playfair, Stark's former pupil and the nephew of natural philosophy professor John Playfair was appointed the architect of the Hill and as a result, his design "follows closely the most explicit advice in Stark's report"—the bridging of Calton Hill to Princes Street (144). Regarding the building of the new Calton Hill access, Lord Cockburn would remark,

> The effect was like the drawing up of a curtain in a theatre. But the bridge would never have been where it was except for the jail. The lieges were taxed for the prison; and luckily few of them were aware that they were also taxed for the bridge as the prison's access. In all this magnificent improvement, which in truth gave us the hill and all its decoration, there was scarcely one particle of prospective taste (Memorials 228-229).

Despite their role in financing Waterloo Place, Cockburn deplored the presence of the jails on Calton Hill. Of the Bridewell and the structures built on either side of it, he complained "It was a piece of undoubted bad taste to give so glorious an eminence to a prison" (Ibid).

Exhibition Horrors

The poor and the working classes may have facilitated the construction of Calton Hill as the Acropolis of Modern Athens, but the vagabonds and loose tribe of the town were not welcome there. The notion of such undesirables on the Calton Hill probably haunted Lord Cockburn, despite being a Whig Reformer and therefore supportive of "elective franchise, ballot-box, representative assembly"–concepts that Thomas Carlyle would disparage as "Benthamee" (Mirzoeff *Right to Look* 136).[135] Nevertheless, even if by extending the vote to ordinary middle-class men made Reform more inclusive than Carlyle's belief in only a few Great Men, Cockburn still ascribed to a society that operated through exclusion and marginalization. And even before the 1832 passing of his and Jeffrey's Reform Bill for Scotland, Cockburn had misgivings about the potential abuse that might stem from the "growing might of 'the people'" (Miller 116). His scorn for popular culture can be read in his 1834 diatribe against the first proposal of by Maria Short to build on Calton Hill. It first appeared anonymously in the *Caledonian Mercury* on July 19, 1834 and was reprinted in *The Scotsman* on the same day.

The fact is starting; but the assertion is undoubtedly correct—that with the consent and approbation of the Old Town Council, and with, as we fear, the acquiescence of the present Magistrates, a GREAT WOODEN SHOW-BOX; of more than ordinary size, and of remarkable

deformity, is to be created on the Calton Hill, to the utter destruction of its beauty, and to the complete and lasting annihilation of its romantic seclusion. A building of this sort, once sanctioned on the Calton Hill, will be speedily followed be the erection of Panoramas, Dioramas, the migratory mansions of Travelling Giants, Wonderful Dwarfs, wild beasts etc, etc. All sorts of unbecoming and ridiculous exhibitions will soon mar the beauty of the Acropolis. Of those departed dignitaries who first authorised the lamentable solecism in taste, we say nothing, "De mortuis nil nisi bonum" [say nothing but the good of the dead], but we trust that the good sense of the Reformed Town Council will induce them to check it immediately; and we feel convinced that all classes of the community, whatever views on general of civic policy they may usually entertain, will unite cordially, in resisting to the uttermost this gross and revolting profanation of the noblest natural beauty of which our city can boast.

Let's pause to unpack Cockburn's association of the camera obscura with the panorama. First, the place for a panorama in Edinburgh was decidedly not on Calton Hill, even if the image of its first iteration originated there. Rather, as two engravings by Thomas Hosmer Shepherd in the 1829 publication *Modern Athens or Edinburgh in the Nineteenth Century* illustrate (52, 55), the panorama sat on the Mound that connects Old Town and New Town, not far below the site of the second Short's Observatory on Castlehill. J.H.A. Macdonald recalls the Mound of his childhood, which he describes at length as "a wide, unkept space, which on Saturdays and holidays was the resort of low-class entertainments" including a menagerie, and vendors of all sorts (75). He asserts,

> These veritable memories belong to a period of some years, and are put together to give an idea of how the beautiful centre of Edinburgh was allowed to be degraded into a scene of low-class trade and entertainment more or less discreditable to the city, No wonder Lord Cockburn said of the Mound, "that receptacle of all things has long been disreputable" (Ibid 76-77).

Moreover, Macdonald notes of the image that illustrates his description of the Mound, "The artist has made the buildings much smaller than they were—an artistic license to modify their hideousness" (78).

When Cockburn associated the first proposal of Maria Short and her camera obscura in particular to "unbecoming and ridiculous exhibitions," he probably had what Macdonald calls

the "Mound Horrors" in mind. Yet how unfair was his assessment? Why not identify Short's Observatory as an impermanent, "low-class" amusement given that it was a building of wood instead of stone that Town Council could order removed at any time.[136] A number of camera obscura impresarios had already constructed their devices as itinerant and seasonal displays, and this built-in transience likely contributed to their 'low-class' associations, as well as their eventual disappearance. For example, though likely not a *splendid* type, a camera obscura of significant size travelled with John Nixon in the late 1780s. Perhaps wary of being associated with less respectable show people, Nixon invited "Nobility and Gentry, Lovers of the Polite Arts" to the Boughton-Green Fair in 1788 to visit his "newly constructed grand OPTICAL MACHINE or CAMERA OBSCURA," and the summer after, during the week of the annual horse races in Leith, Nixon re-emerged hundreds of miles north to display in Edinburgh, "one of the most pleasing pieces of experimental philosophy ever put in practice."[137]

Decades later in 1823, Ben Holroyd and his partner Dolly beckoned Edinburgh to visit the camera obscura that they set up on the Mound promising, for the admission price of one shilling, "a rational and entertaining species of amusement to bipeds of all ages." ("Ycleped Royal," in *The Scotsman*, 9 July 1823, 4). They boasted that their 5-foot, 3-inch diameter display was "nearly double that on the Calton Hill" (by which they meant the Astronomical Institution's device in the Gothic Tower) and their speculum was "truth itself." However they advised, "It may be regarded as a moot point, whether the instruments or the proprietors be most curious or most attractive." While Dolly's fate is uncertain, Ben Holroyd died in 1825, and his obituary identifies him as the owner of a camera obscura, explaining that he "travelled the country with the exhibition for a great number of years" (*The York Herald and General Advertiser*, 15 October 1825)

As the devices that toured with Nixon and amused visitors at the Greenwich observatory attest, walk-in cameras obscura never completely disappeared. However, nineteenth-century improvements to lens grinding produced wider fields of focus and enabled increases in the size of projected imagery, which likely enhanced their popularity (Brennan 13). Installations like those offered by Maria Short therefore attracted a modern and mobilized public that hungered

for increasingly spectacular sights, allowing the splendid devices to join the emergent field of urban popular spectacles described by, among others, Rick Altick in his encyclopaedic tome, *The Shows of London.* In 1834, Lord Cockburn feared Maria Short's proposed venue would change his beloved Calton Hill into a site for the growing number of entertainments that targeted what Altick describes as a "widening mass audience" (34). Indeed the Colosseum, the ambitious exhibition site that had then recently opened in London's Regent Park after years of construction, featured at least one large camera obscura. One topped the venue's centrepiece—the enormous panorama of London as apparently seen from the dome of St. Paul's Cathedral.[138] Though intended as a "resort of the rich and the fashionable", financial difficulties forced admission fees to drop in 1832 and the pleasure palace struggled to retain its respectability (Altick 141-163). Lord Cockburn may not have only thought about the displays on the Mound when he fretted over Short's Observatory, he may have also been horrified by the kinds of amusements on offer at Regent Park.

III. The Panopticon

Synopticon

If the presence of a splendid camera obscura conjured in some minds pastimes of a disreputable sort, for others it offered the possibility of policing the kind of illicit activities that they assumed would inevitably follow. The prevention and punishment of crime transformed during the lifetime of Maria Short, alongside urbanization and numerous other changes. For example, in the late eighteenth century, Jeremy Bentham proposed an architectural design for prisons with the purpose of reforming inmate behaviour through their internalization of a constant yet unverifiable surveillant gaze. In *Discipline and Punish*, Michel Foucault identifies Bentham's Panopticon as paradigmatic of discourses of surveillance that characterized a disciplinary society (195-228). He describes the Panopticon's "state of conscious and permanent visibility" as its "major effect" (201)—a "mechanism" that also operated through individuation to create "subjection" and eliminated the need for "force to constrain the convict to good behaviour, the madman to calm, the worker to work, the schoolboy to application, and

the patient to the observation of the regulations" (202). Numerous scholars have since challenged or built upon Foucault's formulation, including Thomas Mathieson.

In his 1997 article, "The Viewer Society," Mathieson identifies the Synopticon—a system where "the many saw the few"—as an inverse to the Panopticon, where "the few see the many", and explained that the two phenomena nevertheless share a parallel history with "reciprocal functions" (215). As a top-down strategy, he refers to the Synopticon as essentially mass media and identifies "the first wave of mass media after the printed book" as the "mass press," dating its emergence to the years between 1750 and 1830 (220). While Mathieson explains that synoptic media support surveillance practices by communicating their operation as necessary and benign, I would add that printed reviews, anecdotes and illustrations of nineteenth-century splendid camera obscuras acted as participants in that process. Their mass media representations as popular forms of panopticism helped naturalize surveillance and reinforce behavioural norms.

Crime

Instead of splendid camera obscuras attracting miscreants, nineteenth-century writers frequently imagined how they might help catch them. For example, the Glasgow Mechanic Magazine advocated the placement of camera obscuras in "all public places of amusement and exhibition," after a pickpocket was caught in the camera obscura screen at the 1824 Glaswegian Fair Week and afterwards arrested promptly (qtd in "Use of the Camera Obscura," *History of Photography*, 37). Many years later, when recalling the visits of his childhood to Short's Observatory on Castlehill, George Scott-Moncrieff confessed his boyish fantasy of seeing "some horrible crime enacted on a roof-top, the perpetrator presuming himself safe from all eyes, but forgetting the Camera Obscura!" (41). Such anecdotes, usually told in jest, imagine a splendid camera obscura as a crime-stopping apparatus and so bring into sharper focus its resemblance to the central watchtower of Jeremy Bentham's Panopticon that places its inmates under constant, visible but unverifiable surveillance. Although Foucault would describe this effect as distributed throughout society from the late eighteenth century onwards, and explored a range of discursive and procedural techniques (for example, the confessional in *History of Sexuality*,

19-21) as forms of disciplinarity and governmentality, the Panopticon modelled a power/knowledge relation, visually and spatially, through architectural design.

Bentham and its original designer, Robert Adam, expected the Edinburgh Bridewell on Calton Hill to be a panoptic prison. However, in the wake of Adam's death and the completion of the project by his brother James Adam, its failure to meet some of Bentham's specifications, alongside a conflict over attribution, caused disappointment and resentment (Markus 78). Larger rooms for daytime work blocked the view of individual prisoner cells from its central tower and made impossible the surveillance or the impression of surveillance at night that Bentham thought necessary for the internalization of a repressive gaze. On the other hand, William Stark, who had also written the influential report on Calton Hill, proposed a panoptic design for a Glasgow asylum, which is outlined in a pamphlet he published in 1807. In introducing his radial plan, Stark describes the need for a mental institution to "classify the insane patient by 'rank of life' (i.e. the ability to pay), sex, degree of insanity and the degree of liberty, he ought to enjoy," and his design answered that need by subdividing his proposed architecture to spatially sort and confine inmates into categories, which he "coupled with an awareness […] that an unseen eye is constantly following them, and observing their conduct" (Ibid 94-95). As Markus observes, third-generation York asylum director Samuel Tuke initially admired Stark's proposal because it afforded "better supervision" in his 1813 book *Description of the Retreat*, but in an 1819 report Tuke criticized its resemblance to a prison in Ipswich, because unlike facilities designed to treat mental health, he thought that it would not accommodate the "inmate's progress" (Ibid 96-97). Such examples suggest that the recognition of the Panopticon's supervisory advantages prevailed over Bentham's idea that criminals would reform their behaviour by internalizing its constant surveillant gaze. Whether anyone imagined that the presence of a camera obscura would cause a pickpocket or felon to hesitate is doubtful, even though the fanciful notion that one might aid in capture persisted. Moreover, whether humorous anecdotes published in the popular press served as precautionary is doubtful given that their readership did not likely have criminal intents in mind.

Nevertheless, popular representations of splendid camera obscuras suggest that they did play a role in panoptic discourses, except any behaviours they might help regulate would be of a less criminal and more middle-class sort. For example, Edinburgh newspapers recount how Dr. Renton broke the tension in a Town Council meeting over the unauthorized installation of the camera obscura in the Nelson Monument on Calton Hill. Since its screen watched over the city, he recommended the stationing of "two policemen" there to monitor the employment of vehicles used for church-going on Sundays, who could then "furnish a weekly return to Council, which would show the exact statistics" (*The Scotsman* 9 May 1949). While his suggestion was met with laughter, its reporting in both *The Scotsman* and *Caledonian Mercury* signalled to readers that their observation of the Sabbath might also be literally under watch. However, as the century proceeded and their installations became increasingly associated with non-scientific leisures, anecdotes and images of splendid camera obscuras communed with other forms of morality.

Voyeurism, the policing of sexuality, and especially, the behaviour of young women appear especially common to popular representations of splendid camera obscuras, and contribute to a long and ongoing history of gendered surveillance. In their introduction to *Expanding the Gaze* (2016), a recent collection of articles regarding the topic, editors Emily van der Meulen and Robert Heynen observe, "Girls and women remain over surveilled, especially in terms of the formal and informal policing of perceived gender deviance, either in terms of gender identity itself…or in terms of sexuality" (13). There is a logic of "invisibility/hypervisibility" that has "women underrepresented in many areas and excessively represented […] in others" (11). Nevertheless, alongside the editors of *Feminist Surveillance Studies* (2013), Rachel E. Dubrofsky and Shoshana Amielle Magnet, they furthermore note that scholarship on surveillance has been slow to systematically address gender or include accounts of feminist interventions, despite their acknowledgements of related work in other areas, such as feminist media and film studies. The editors of both collections recognize surveillance as an intersectional issue that is centuries old, and also cite Laura Mulvey and her theory of the male gaze in classic Hollywood film as foundational, alongside Foucault's work on the Panopticon and his genealogical studies on sexuality and madness.[139] For example, in *Hard-core: power, pleasure and "frenzy of the*

visible (1989), Linda Williams describes late nineteenth-century optical media that focused on kinesthetic movement, and more specificity its development towards hard core pornography, as "a powerful manifestation of both the surveillance mechanisms described by Foucault and this *scientia sexualis*" (35). Williams describes *scientia sexualis* as a construction of power/knowledge that is founded on "measurable, confessional 'truths' of a sexuality that governs bodies and their pleasures" (Ibid 34).

The "panoptic gaze" is therefore an internalization of the "voyeuristic gaze" for feminist theorists who "underline the one-way power of gendered looking," although Anne Friedberg disrupts the monolithic character of the male gaze by examining mobile spectatorship through the figure of the nineteenth-century flaneuse (*Window Shopping* 16). She writes,

> To find the origins of a female observer—a public woman who was neither a *fille publique* [woman of the streets] nor a *femme honnête* [the respectable married woman]—one has to turn to the new spaces that appeared in the mid-nineteenth century, public spaces such as the department store or the amusement park, spaces where women could exist outside of these two narrow definitions (Ibid 36).

What then would Friedberg make of the woman pickpocket caught in the camera obscura screen at the Huxley fair? The account, which appeared in the *Blackburn Standard* in 1898, mirrors the story of the 1824 Glaswegian fair, but focuses on the behaviour of the victim (a witless *flaneur*) and the offender (*une fille publique*), as seen by the victim's fiancé (*une femme honnête*) as a spectator at a splendid camera obscura. In "That Camera Obscura." the writer recalls watching like "an invisible ghost" as a "bold-faced thing, with pink bonnet ribbons" flirted with her then-fiancé (*Blackburn Standard*, 30 April 1898, 7). She writes, "The rest of the picture was nothing. I watched him; I saw him talk to her; I saw him treat her; I saw her stare at him and once I made a grab at her bonnet [on the screen] but drew my hand back again" (Ibid). When the spying girlfriend sees the other woman lift her boyfriend's wallet and with it, a large quantity of cash, she rushes outside, alerts the police and helps in the offender's arrest. The anecdote concludes with the revelation that the actions took place twenty-five years earlier, the couple reunited, and even though the wandering young man was not blameless, he is forgiven while the seductive lady thief is jailed.

Sex

Although illustrations and stories from nineteenth-century dailies, illustrated magazines and memoirs that include splendid camera obscuras often reference criminality and couples, "That Camera Obscura." is unique for its fusion of seduction and thievery, and its identification of a woman perpetrator. Nevertheless, note that the story's only innocent is the narrator—that is, assuming her report is nonfiction and not a made-up story possibly written by a man. Other representations of couples caught on a camera obscura screen may be less oriented towards crime-stopping but no less voyeuristic. For example, the reviewer of the Dumfries camera obscura reported, "Ladies, too, were seen ascending the hill, and their persons identified; as well as a lady and gentlemen walking in a garden, and the anon resting in a summer-house, who might be lovers for aught we know to the contrary," (*Dumfries Courier*, 3 August 1836). However, two illustrations from the late nineteenth century portray observations from inside splendid camera obscuras of men pressing themselves onto their female companions. An 1880 cover of the *Illustrated Police News* depicts two women observing a couple seated on a bench with the man leaning into the woman beside him (figure 17). Whether the embrace is consensual is impossible to determine. The picture is reproduced on the website of Jack and Beverly Wilgus, who explain "The cover illustrates a story of an unlucky husband who takes a young lady (not his wife) to Coney Island only to have his wife and her friend visit the camera obscura which overlooks the spot where they are sitting" ("Images of Lost US Seaside Camera Obscuras in Our Collection" in http://brightbytes.com/cosite/lost_us_beach.html). The Wilgus collection also includes a cartoon captioned "At the beach", from an 1890 issue of *Puck* magazine (figures 19a and 19b). Although no bathers can be seen, the lurid allure of the seaside attraction is evident in the capture of a private indiscretion. Spectators watch as a man angles towards the young lady seated beside him. Unaware of their appearance on the screen of a nearby camera obscura, he exclaims "Ah Alicia, at last we are by ourselves, away from unsympathetic and prying eyes!"

Based on their collection of photographs, cards and assorted memorabilia, Jack and Beverley Wilgus estimate that "the pier at every seaside resort in the United Kingdom," once featured a camera obscura.[140] Brighton, the Isle of Man, Margate, Portobello and Swansea are among the

numerous resorts that hosted seaside cameras. That the devices would enable sightseers to privately observe other bodies enjoying the beach and frolicking in the surf would have doubly abhorred Lord Cockburn. At least two splendid cameras obscuras appeared on the Scottish coast. The Scotsman newspaper advertised a splendid camera obscura at the Rothesay Aquarium in 1876, and another with an associated "observatory and museum" that opened at Portobello Pier near Edinburgh in 1878 (*The Scotsman* 6 July 1878). A later notice for Portobello advised, "Visitors should not fail to see the Camera-Obscura, said to be the largest and finest in the kingdom" (*The Scotsman* 11 June 1880).[141]

The "universal simplicity" of bathing at Rothesay did not trouble Cockburn in 1843 (*Circuit Journeys* 123), but a year earlier he complained that he "never saw bathing performed by ladies in Scotland even with common decency." He called Portobello "the most immodest place in Scotland" since its bathing machines offered the opposite of "protection" by being used "nearly touching, by men and women indiscriminately" (Ibid 110). In a letter to his daughter, where he declined her invitation to the 1851 Great Exhibition by pronouncing it "Vulgar!" Cockburn explained that he was also unable to endure "maritime indecency" and dubbed Portobello, "Porto Nudo" (*Some Letters of Lord Cockburn* 66-67).

Not everyone born in the eighteenth century was as priggish as Cockburn, and the erotic potential of the splendid camera obscura would entice some early in its history. In a fictitious letter written in 1802, the protagonist of humourist Josef Richter mused,

> Since they haven't quite finished painting Vienna yet at the Panorama hut, they're going to show a camera obscura. (That way they'll have a little money coming in at least.) A few days ago I heard one of our young men-about-town ask a friend, "What on earth is that?" And when he learned it means "dark room," the young gent leered and said, "Well, if they've got pretty girls in their dark room, I suppose I'll go too (qtd in Oetterman 288, original emphasis).

Richter's story is a reminder that darkness conceals spectators inside a camera obscura. Nevertheless, its illustrations depict fantasies of spectatorship and sexuality by disclosing the potential for physical interactions between bodies both outside and in. Whereas the camera obscura that Crary associates with discourses from a pre-rupture era constructed an isolated observer cut off from the exterior world, drawings of its post-rupture version show groups of

viewers in close quarters together peering intently at the screen. They illustrate the reactions of insiders as ranging from dismay to curiosity to titillation. While such images might serve as disciplinary warnings to would-be paramours, potential predators and their targets, they also suggest the pleasure of catching moments of privacy between unwitting pairs. In depictions of the interior of a splendid device, Freud's primal scene (the unseen observation of parental coition) and its arousal are enacted and doubled, as the intercourse of spectator bodies is also put on display. Although they should be invisible ghosts shrouded in the dark, we watch them, as they perform intimate and tactile engagements with each other, and with the screen. As if attempting to enter a scene of seduction, voyeurs lean forward, sometimes touching the image before them. Young women appear provocatively vulnerable—outside in the clutches of aggressive lovers, or inside bent over the screen, bustles prominent but forgotten in their owners' enchantment (figures 17 and 18).

Vulnerability

Such illustrations anticipate twenty-first century constructions of female vulnerability, which promote the use of video surveillance as a form of protection. They moreover support the argument by Van der Meulen and Heynen that,

> Gendering the field involves thinking about surveillance practices as socially located as embodied and as having differential impacts. This perspective also brings longer histories into view, offering a corrective to the more present-centric tendencies that see surveillance as dramatically new (4-5).

In discussing the "problematic of surveillance and gender," alongside their reinforcement of norms, Hille Koskela argues "On one hand, surveillance equipment can be read as a sign of danger (distrust, need for control) and can thus amplify a sense of vulnerability. On the other hand, the promise of increased security generates a pressure for women to accept surveillance" (53). Moreover, she explains the failure for visual surveillance to prevent, intervene in or even identify cases of sexual harassment and the likelihood that visual surveillance in itself can be constituted as a form of harassment with non-consensual usage of surveillance images (Ibid). As precursors to "lateral surveillance" defined by Mark Andrejevic as the "peer-to-peer surveillance of spouses, friends, and relatives" (481) that is enabled by the "democratization of

access to technologies and strategies" (482), such as background checks previously available only to dominant institutions (in effect, online and do-it-yourself tools), splendid camera obscuras also offered the promise of citizen policing. Some practices could be as relatively innocuous as monitoring Facebook friends, yet provocative representations of female vulnerability can also be aligned with Internet-based practices of "slut-shaming" described by Leore Tanenbaum. In response to Tanembaum's critique of Twitter accounts, hashtags and web-based forums that host non-consensually distributed or covertly-taken photographs of women, Lucy E. Thompson takes an art historical approach to support her recognition and situating of "slut-shaming as a gendered form of surveillance" (327) that long predates social media. Following her analysis of the composition and symbolism found in the seventeenth-century Vermeer painting *'*A Girl Reading a Letter', Thompson explains

> Whereas in contemporary selfies or creep shots the *individual* is the target of peer scrutiny, in Vermeer's painting the girl reading is (and possibly more powerfully) a representative rather than an individual, whose anonymity helps to spread shame to the group to which she belongs. Slut-shaming as perpetrated by online users does the same work: it reminds women that they are under surveillance at the same time as it aims to alter behaviour (original emphasis 337).

Illustrations and anecdotes of couples, and especially women, caught by the screen of the camera obscura perform in a similar fashion—they model certain types of behaviour as shameful, and so sublimate the potential shame of scopophilia itself by transferring it to those under watch.

Discipline

The installations of splendid camera obscuras at places of leisure enabled sightseers, tourists and day-trippers to spy on each other without the risk of impropriety associated with staring, since they transform the act of looking into a hidden, in-the-dark activity. Illustrations and stories connect to gendered discourses of surveillance to voyeurism in numerous ways. As panoptic discourses, they remind viewers (and readers at home) to act in certain ways since their own behaviour may be subject to public scrutiny and expectations of privacy cannot be assumed. Moreover, by representing relations between men and women captured onscreen, they reinforce a form of middle-class heteronormativity that recognizes only certain kinds of

bodies and relationships, and dictate how those should play out.[142] Public infidelity is treated as punishable and men are portrayed as physical aggressors, even if they are partnered with willing participants. Even the seductress with the pink bonnet ribbons acts with the intent to steal and not to fulfill her own sexual desire. Therefore, a lecherous heterosexual is the only kind of man that appears at a camera obscura, whereas none of the women portrayed make any show of sexual desire—the women on the benches are passive if not resistant to the advances of their companions, and even the flirt with the pink bonnet ribbons is interested in nothing more than her target's wallet. Nineteenth-century camera obscura representations however ignore behaviours that Victorian society rendered invisible and not only because certain violence happened behind closed doors and out of view.

Sensational examples of nineteenth-century crimes in Edinburgh include the purchase of Burke and Hare's murdered corpses by the anatomist Dr. Knox and the burglaries of the Deacon William Brodie. One might argue that their discoveries did transpire and so did their punishments, but the respectability of the gentlemen concerned probably slowed the revelations of their offences. Yet, what day-to-day domestic violence persisted under the perpetual cover of patriarchal regard, including against the countless but unseen members of middle and upper-class households that worked in service or slavery? Andrea Smith identifies gender violence and strategies of "not-seeing" as fundamental surveillance strategies of "settler colonialism and white supremacy" (26). While light-hearted representations of splendid camera obscuras at the British seaside and fairgrounds cannot be equated with the expropriations of property and self-determination from colonized and enslaved peoples, they belong to the same moment and share continuity with the imperialist, colonialist and patriarchal system that structured them.

Print media and the locating of splendid camera obscuras, first as scientific amusements and then at places of leisure, synoptically rendered the use of surveillant optical media playful and apparently benign. The gaze through the screen threatened criminals, philanderers and perhaps most significantly, women in general. At least one woman wanted to avoid its panoptic eye.

Resolved to never marry should she not find a "love so pure" as between Eloise and Abelard, Jane Welsh wrote to a friend in 1822,

> It is the decree of fate! dear Eliza. It is the decree of fate! So look about for a nice pleasant little garret that has a fine view unclouded by the town smoke and out of reach of the camera obscura and we will take up together (Jane Welsh to Eliza Stoddard, 15 January 1822, Carlyle letters online).

Had Eliza had come through, what life would Jane have experienced? Instead she married Thomas Carlyle—a man who embraced the camera obscura and a tower top view, and a suitor that had already started corresponding with her "under the pretext of guiding her reading" after their introduction, and whom she rebuffed until 1825 (Christianson 69-70). His literary career and her wit, some of which is captured in the correspondence she shared with friends and intellectuals, made them a kind of celebrity couple. Rumours about their emotional affairs rendered their union famously unhappy, and there persists talk that Welsh died a virgin. Her doctor and post-mortem examiner allegedly gossiped about her intact state while supposed friends claimed that Carlyle admitted being impotent or asexual.[143] In other words, the Welsh-Carlyle marriage suffered its own kind of surveillance and sex-shaming. The frequently quoted remark by novelist Samuel Butler is one of the gentler judgements concerning their private life. He wrote, "It was very good of God to let Carlyle and Mrs. Carlyle marry one another, and so make only two people miserable instead of four" (Samuel Butler to E.M.A. Savage, 21 November 1884).

IV. The Touch

Vision

Despite my contention that popular representations participated in discourses of surveillance and voyeurism, and so may have conditioned experiences of splendid camera obscura for some, those descriptions have little to do with the ways the devices actually operated. For example, the images from *Puck* and *The Illustrated Police News* depict the couples spied on screen from a position that makes little sense.[144] They are composed as if being watched from roughly the

same level—like an eye through a keyhole—rather than seen by the kind of camera obscura they portray, which would picture them from above through a periscopic assembly. The rooftop placement of optics would create aerial perspectives, with the tilted down light-emitting mirror presenting views of the closest areas with sharp downward angles, and distant areas appearing along the horizon when the mirror tilted back up. In other words, if the panorama recreated the prospect of a tethered balloon, or the first moments of its launch, then the splendid camera obscura recreated a prospect that might be seen through the balloon's floor. Such a view could be likened to the "balloon geography," first described by Thomas Baldwin in *Airopaidia* (1786), which he published after his "one and only flight in a balloon" (Kaplan 69). Baldwin not only described and reproduced a circular view, which a circular screen of a splendid camera obscura mimics, he also recommended mapmaking "from the car of a balloon, with a *camera obscura*, aided by a micrometer applied to the underside of the *transparent* glass" (qtd in Kaplan 92, original emphases). Yet perhaps what is most striking about accounts by Baldwin and other early aeronauts is how defamiliar and surprising their experiences seemed. Kaplan writes "They were, at first, often simply confounded and amazed" (71). If the views in a splendid camera obscura appeared similarly strange, then the quality of their guided presentations by onsite operators would have been particularly significant.

In this section, I explore other aspects of the splendid camera obscura that might otherwise be mistaken, minimized or omitted, drawing from my own experiences and observations while highlighting details from contemporaneous descriptions. Here I continue the opening paragraph of the Introduction where I positioned you inside Maria Short's device at her popular observatory on Calton Hill. My inspiration is Alison Griffiths, who in *Shivers Down Your Spine* (2008), invites her reader into Barker's panorama in 1793 and opens her second chapter by writing, "Picture yourself walking through a darkened, narrow corridor that leads upwards to a staircase drizzle with light…" (37). Griffiths confesses,

> As futile as it may seem to try and reconstruct late-eighteenth-century audiences' experience of panoramas for a twenty-first-century audience, and leery of reproducing contemporaneous hyperbolic accounts of the "unsurpassed realism" of the attraction, I want to suggest that there nevertheless remains something very strange (even uncanny) about the nature of panorama spectatorship (Ibid).

She mentions her visits to three painted panoramas, and that firsthand knowledge supports her description of a "heightened sense of embodiment" (Ibid), which my own experience at one of them—the Cyclorama of Jerusalem outside of Quebec City—confirms.[145] I also spent time at four splendid camera obscuras (in Edinburgh, Dumfries, Bristol, and Greenwich) as a kind of parallel approach for my study. Yet before unpacking those experiences, I return to the panorama since its effects are relatively well documented and as a related device, there are more fruitful comparisons to be made. However, the two diverge in a way that frames the latter part of this section. The panorama presents, as Griffiths explores, an immersive experience, whereas I explore the splendid camera obscura as a tactile device. Note that both suggest embodied forms of looking. In other words, here I attempt to undo potential misconceptions about the devices caused by previous conflations of camera obscuras as generic forms, contemporaneous discourses of tower-power and surveillance, and the relative absence of first-person accounts of that pay attention to things other than what might be seen on a screen.

As attractions frequently frequented by sightseers, both the panorama and the splendid camera obscura engaged sightseers—spectators that were already mobile—and mobile spectatorship has drawn attention from numerous media scholars since Walter Benjamin (Bruno, Buck-Morss, Friedberg, et al). Yet when virtual tourism transforms voyager to voyeur, it does not necessarily shift them from a mobilized and embodied state into one that is immobile and disembodied. Reports of panorama experiences indicate the medium's potential to induce two types of reactions: 1) "a static mode in which the viewer perceives depth by focusing on one perspective point;" and 2) "a mobile, haptic mode of visuality," that was sometimes accompanied by the "sensation of seasickness" (Oleksijczuk, 70). From the turn of the nineteenth century, reviewers tended to frame the two effects in gendered terms. While the first type of experience supports assessments of the panorama as evoking a masterful point of view, early reviewers associated the latter with female spectatorship. For example, newspaper reports cautioned "ladies of a nervous disposition to be on guard" (Griffiths *Shivers* 56) even though men might also experience fainting and dizzy spells. Rather than waiving off such accounts as apocryphal or patronizing fictions, Griffiths wonders whether the first women to

visit panoramas were, by being barred from many worldly experiences, less desensitized to depictions of battlefield gore and the vertiginous affects of high points of view (Ibid 58-60). On the other hand, Oleksijczuk explains that

> Three of the Panorama's distinguishing features—its enhanced realism, multiperspectivalism and elevated, central vantage point—had a tendency to produce cognitive uncertainty and disorientation as much as a sense of domination and control (11).

There are splendid camera obscura counterparts to those three panorama features. The first is enhanced realism and Oleksijczuk explains Barker used distance and lighting to augment his painting's verisimilitude and presence (11). The image was so far from the spectator that paint strokes and surface irregularity would go unseen, and any absence of detail or contrast would feel like the natural failing of eyesight. Barker also specified that the picture be bright and the viewing area be dark. This minimized visual distractions (for example, the other viewers) and kept eyes directed at the show. Although the effect would dramatize any presentation, a camera obscura has that lighting condition by default. As for the reality of a camera obscura image, much has been said of its stunning effect—however it is worth noting that this would have been enabled by significant and ongoing refinements to lenses, mirrors, and mechanical controls that reduced distortion and improved focus. Moreover, as a purely optical medium, a camera obscura has none of the visual artefacts associated with later media such as film grain, scan lines, or digital glitches from compression so its clarity can astonish even twenty-first century viewers. I have frequently heard remarks about the "high resolution" of a camera obscura—which makes no sense for a medium without digital pixels.

The second feature of a panorama was multi-perspectivalism, which enabled the viewer to pivot full circle and reference one of numerous perspective points situated along the horizon. Even if Barker's painting was based on sketches drawn with the aid of a camera obscura that appeared perfectly accurate when seen alone, they would still have required modification to make a continuous and undistorted image once assembled in the round. Having already "invented a mechanical system of perspective," Barker senior focused on the horizontal lines at the viewer's eye-level and developed a "system of curved lines peculiarly adapted to the

concave surface of his picture" (*Art Journal* 46). The image seen at a splendid camera obscura required no equivalent, but the turning and tilting of its optics enable it to likewise present an infinite number of perspectives.

The final panorama feature that Oleksijczuk mentions is the elevated, central vantage point. The "visual sovereignty" enjoyed by viewers of either gender presented from the towering point of view of the panorama provided the masculine alternative to feminine feelings of motion sickness (Griffiths 77). Nevertheless, being enveloped by a fully immersive view could also cause disorientation, which as Oleksijczuk notes Barker tried to mitigate with presentation material that could help visitors focus on single areas in order to retain their composure (14). While the camera obscura operator fulfills this role, the viewer is never enveloped by the image even if it appears from an elevated, central vantage point. Looking down from a birds-eye point of view might suggest the potential for vertigo, yet the solidity and tabular placement of the screen probably mitigates that sensation. I wonder if placing a camera obscura screen on the floor like the transparent window of Baldwin's balloon geographer, would induce a more spine-tingling affect?

The panorama conditions divergent experiences that correspond to the "main visual subcultures," which Martin Jay identifies as competitors within the contested terrain that he identifies, borrowing a term from Christian Metz, as "scopic regimes of modernity" ("Scopic Regimes" 3). Jay contends that unlike the premodern and postmodern eras, modernity (which he traces to the "Renaissance and the scientific revolution"—in effect, the time of Galileo) "has been normally considered resolutely ocularcentric" (Ibid). Jay traces the history of ocularcentricity and the twentieth-century demotion of vision in *Downcast Eyes*. However, in his contribution to Foster's *Vision and Visuality* project, he identifies three visual subcultures at work and all relate to perspectival forms.

First, he associates "Cartesian perspectivalism," with the Quattrocento pictorial tradition, initiated by Brunelleschi and Albert, that structures a composition of "three-dimensional, rationalized space" around a static monocular eye (6-7). Widely critiqued as a disembodied, dispassionate and masterly point of view, "in league with the scientific world" and also

"complicitous … with the fundamentally bourgeois ethic" of capital (9), Cartesian perspectivalism can readily associated with the dominant and masculinized experience of the panorama, as well as understandings of camera obscuras that associate them with distantiated, towering and panoptic vision.

Jay cites the discussion of seventeenth-century Dutch art in *The Art of Describing* by Svetlana Alpers, and following her lead distinguishes the Northern form of perspective from Cartesian perspectivalism (12). As Alpers and her followers contend, Dutch paintings emphasize description and surface over narrative and pictorial depth, which they associate with Renaissance art. Jay writes, "Rejecting the privileged, constitutive role of the monocular subject, it emphasizes instead the prior existence of a world indifferent to the beholder's position in front of it…If there is a model for Dutch art, it is the map with its unapologetically flat surface" (12). Art historian Celeste Brusati considers looking at Northern paintings a temporal and mobile experience. Building on Alpers, she explains that the "traditions of perspective theory and practice in the Netherlands accommodate an understanding of pictures as additive composites of aspects" (912). In other words, Dutch painting, like a panorama painting, comprises multiple perspectives and similar to Barker's solution, they align multiple vanishing points across the horizon, which they place at viewer eye-level.[146] The panorama and splendid camera obscura also share, with the Art of Describing, an appeal to their viewers to scan the surface. At a panorama, this is done with the aid of a viewing guide that encourages a frequently unidirectional scan/tour of the painting. At a splendid camera obscura, its operator creates a mapping of its surroundings as she gives her virtual tour by shifting the framing of a continuous aerial view.

The final visual subculture or "mode of vision" that Jay identifies is "baroque vision," and he draws the notion of its anti-ocular potential for disruption from the work of philosopher Christine Buci-Glucksmann ("Scopic Regimes" 16). In *The Madness of Vision*, Buci-Glucksmann identifies anamorphosis as an emblematic form, creating in its extreme the disturbance that "defines *the unconscious of the baroque gaze*" (11, original emphasis). Anamorphosis is a perspectival construction that dates to the sixteenth-century and its illusory effects are

constructed through the placement of the vanishing point outside the picture plane.[147] A deformed, nonsensical image is restored to a rational state by the positioning of the viewer eye at an oblique angle (for example, the anamorphic skull in the foreground of the 1533 painting of *The Ambassadors* by Hans Holbein) or through the mediation of a curved mirror or lens. Referring to Jean François Niçeron (1613-1646), the Minim friar who wrote *La perspective curieuse,* a 1638 treatise on anamorphosis, Buci-Glucksmann explains,

> This being a completely ambiguous articulation of distorted vision that is both "unreasoned" and, according to another reason "reasoned," to use Nicéron's terms. So much so that this philosophy of doubling, metamorphosis, and mask characterizing the baroque would constitute an elision of science and lure, reason and unreason, according to a law that is always divergent, oblique (10).

I have been striving to determine whether baroque vision, could be at work in a panorama or implemented at a splendid camera obscura as a kind of disruption. In *The Vatican to Vegas* (2004), Norman Klein writes the following of the panorama:

> It is a reversal, in its way, of the Baroque special effect. To explain, let me return briefly to the Baroque technique: Through perspective awry (ceilings, sculpture, etc.), the Baroque illusion starts off by looking hyperreal, as real as nature could hope to look. Then the Artifice takes over; that takeover becomes the charm and message of the Baroque scripted space.
>
> By contrast, in giant panoramas, the machinery can be heard humming right away. The trompe l'oeil devices also look obvious at first. That is part of how the wonder is set up. The viewer walks and waits, getting ready for entry. The all embracing view dissolves the trickery; the Artifice immediately gives way to nature…
>
> In effect, as special effect, the longer you stay, the more natural it becomes (184-185).

Klein makes note of the temporal qualities of the baroque special effect and the panorama, and an observation of temporality could be extended to a camera obscura. The artificial quality that in anamorphosis takes time to recognize is its spatial distortions. In a panorama, it is artificial stillness that takes time to overcome. However, the artifice at a splendid camera obscura is generally a discursive construction—a fanciful story told by the operator and her framing of a point of view—which may never be overcome. Instead, time offers two revelations. First, as pupils dilate to adjust to the darkness, the projected image appears increasingly vivid, and second, depending on the view first presented, the onscreen motion may appear as surprise.

Movement is especially present up close with people in view, which adds to its voyeuristic appeal. In other words, the effect of a camera obscura goes from naturalistic to even more so.

However, Klein's model suggests, through his concept of scripted space, that experiences unfold in a one-way cinematic logic of linear sequencing. He writes "better to discuss all visual media as innately cinematic" (60). Applying a theory of "special effects," he explains that

> A technological marvel controls an illusionistic environment. It has been set up to deliver elaborate shocks. Within these shocks, an allegory emerges. Staged as an epic journey, this script immerses the viewer in a reassuring adventure. (13).

This scripted and unfurled reassurance may connect to the glorification of imperialism at the panorama that is noted by Klein among others (185; see also Griffiths, Oetterman, Oleksijczuk, etc.). A splendid camera obscura may enable a sense of mastery as well. However, as Buci-Gluckstein explains artifice and illusion can coexist. She writes, "In the complete absence of any cognitive synthesis, the aesthetic effect is alive with the oxymoronic, concurrent display opposites" (13). The madness of vision she associates with the Baroque and anamorphosis comes from the simultaneity of separate and incompatible perspectives and the corporeal effects—nausea, dizziness, sensory overload—of being overwhelmed. In other words, I am wondering if the reported motion sickness of the panorama, which Barker designed guided and mapped tours of the painting to overcome, is akin to the madness of baroque vision.

At a splendid camera obscura, a simultaneity of views would be unavailable at most sites.[148] Nevertheless, its lateral orientation may offer the opportunity for another sort of mad vision. When the periscopic optical apparatus rotates to scan the horizon like a viewer who turns around inside a panorama, the onscreen image does not move like a horizontal pan as you might expect. Rather the projected image spins around a central axis, so that its viewer must circle around the screen with it, should they want to keep their perspective upright. Otherwise, they must be content to look at an angled or inverted scene. An operator that takes care with the instrument and the comfort of their audience, will rotate the view slowly. However, they could cause disorientation by spinning the image, as well as disrupt projection by other forms of performance and interaction.

Experience

Splendid cameras obscura, like panoramas, are attractions best understood by firsthand experience. While some have self-operated controls (such as Bristol) or static devices (such as Greenwich), Edinburgh's Camera Obscura and Dumfries Museum employ guides that further animate their devices even though they display, like all camera obscuras, live and therefore already animated pictures. There, virtual tour operators frame and reframe projections through technical and narrative manipulations—combining camera movement with storytelling. Generating motion and emotion from views and viewers, guides manipulate the devices to sweep and inspect city and vista, while drawing attention to various geographic and architectural features, commenting on local history, and explaining the workings of the device. With controls and controller sharing the same dark and intimate space as the spectators, the mechanics of the cameras obscura are made as central to their experience as the sights they project. Handles or ropes that hang from the ceiling pivot and tilt the periscopic rooftop assembly. One twist or tug of the controls and the angle of view moves upwards to the horizon, making a vertical tilt of the onscreen prospect as its shifts from near to far. Another twist or tug rotates the optics in a panoramic scan that spins the entire scene.

Repeated viewings with different guides suggest that the general structures of presentations remain relatively constant with the recurrence of specific sights and anecdotes. However, there are also improvisations that might vary according to the characters and moods of both the guide and their audience, as well as the sights on screen. Remember, these are live images—there is no ten-second delay, so anything might happen. Yet boredom could also factor in presentation variation. When splendid camera obscuras were less uncommon, it is possible that their novelty would be insufficient for keeping viewers rapt and attentive. Alison Griffiths wonders whether in the 1840s, circular panorama painters "felt compelled to introduce more narrative incident and dynamism into their work" so they could compete with moving panoramas and dioramas (*Shivers* 51). That same decade saw Short's Observatory draw criticism for their aggressive solicitation tactics, so it is possible that presenters also injected extra drama and entertainment into their screenings. There is also the need for the presenters to maintain the appearance of interest and freshness.

Consider the present popularity of Edinburgh's Camera Obscura, which translates to multiple showings of its rooftop device every hour, seven days a week. Ironically, sightseers most often pack in when weather is bad, not realizing that a camera obscura image is most vivid on sunnier days. If it is too dark outside, visitors must content themselves with the venue's numerous other optical wonders, but dull skies rarely interrupt the flow of its dark room screenings. Each show that I've seen there begins with the Castle and then circles around the city to end on a view of the traffic and sightseers along the Royal Mile. While they invariably feature the picturesque sites of Calton Hill and the Firth of Forth—"No, that's not the coast of Norway"—, reminders of the device's voyeuristic nature occur with a pause to look at the College of Art where guides mention that a young Sean Connery posed nude for there for life-drawing classes , as well as an observation of the windows of the Ramsay Garden apartments, allegedly kept small because its developer, Patrick Geddes, being also a former owner of the exhibition tower, was well aware of the camera obscura view. The show always ends in a similar fashion. The guide stops on an aerial perspective that clearly shows nearby activity on the Royal Mile, then takes a piece of white card, folds it into a tent shape and places it on the projected image of the street, so that it acts as a bridge that traffic appears to cross over. Then she distributes paper to audience members and shows them how to use it to catch and lift parts of the projection—often, unwitting pedestrians—above the screen. Sometimes the guide will encourage their visitors to gently handle their captives, and at other times incite them to violently slap them back down.

Interaction with the Edinburgh screen dates back to at least 1947, when its present assembly premiered (figure 16). Mr. Hart refitted the tower with new and repaired instruments after he leased the building from the Short's Observatory trustees following the deaths of Maria Short and Robert Henderson, and may have replaced the original optics during his 1872 renovation of the camera obscura (*The Scotsman*, 10 August 1872). Presumably, Patrick Geddes left the device as is, when he took over the site two decades later. Yet as the tower neared its hundredth anniversary and visits to the camera obscura increased with postwar tourism, his son Arthur Geddes, the Outlook Tower Association, and staff of the Regional Planning Advisory, which occupied three floors of the Tower, deemed renovations necessary for reasons of

safety.[149] Papers from architect Antony Wolffe, who worked for the Regional Planning Advisory and took charge of the project indicate that,

> The Camera Obscura became a very active visitor attraction after the end of the war in the summer of 1945. The display of the camera was in the Upper Floor of the Turret on the roof. This became quite hazardous and alterations to the camera were proposed to project the image to the lower level of the flat roof of the Tower.[150]

In place of a rickety climb into a cramped garret, the tower's central stone staircase now leads to a sixth-floor chamber that houses a tabular screen encircled by a three-tiered platform that easily accommodates at least thirty adults and even more children.[151] While Wolfe's documents indicate that the tabular screen maintained its original 4-foot diameter, the span between it and the rooftop aperture increased from just over 9 feet to about 28.5 feet (figure 16). More than tripling the distance to the screen obliged a new set of optics with a longer focal length, which Barr and Stroud, a firm from Glasgow that had been making military periscopes and rangefinders, supplied. They installed a three-lens apparatus that also simplified operation by eliminating the need to focus the image by adjusting the height of the screen. The assembly moreover increased the focal range of the projection, which facilitated the ability to catch its image on another surface and keep its picture in focus while lifting it high above the screen.

Reviewing the "new and improved camera obscura" in 1947, after visiting it with a small child, a local newspaper contributor wrote,

> The commentator in charge was a pleasantly discursive young man, who did something that the previous operators had omitted. Pointing to a motor car on the screen he would catch its image on his wrist and lift it up the Royal Mile. This pleasing sleight of hand sent our associate into raptures, and bitter was her disappointment when, on descending the firm earth, she found that she could not scoop a Corporation motor bus up – not even with both hands ("Obscure Room," *The Scotsman,* 16 May 1947).

The writer highlighted other embodied aspects of their visit, including the arduous climb up the tower stairs and how two of them boosted their "microscopic lady" companion as they "moved slowly round the screen." Recalling earlier exhibitions, they commented that the view was "as stirring as ever" and that "the same old washing flutters on the same old line and was pointed out with even more than the same old candour." In short, they reported a dynamic, engaging,

and physically embodied performance that remained in the mid-twentieth century, despite its long history, “one of the most fascinating screen shows in town.” Its freshness after almost a century then and seven more decades now, points to the almost timeless nature of the camera obscura.

Can the interactive nature of Edinburgh’s Camera Obscura presentations be wholly attributed to its twentieth-century optics or could similar displays also take place in the previous century? While there remain few indications of how splendid camera obscura operators presented during the time of Maria Short, shows of the extant device at the Dumfries Museum suggest what might have been possible during the nineteenth century. I visited the Dumfries camera obscura twice and each time, was astonished by the brightness and clarity of the optics that Mr. Morton installed in 1836. The Dumfries caretakers have meticulously kept its original lens and table, having only the ropes that control the periscope assembly occasionally replaced and the rooftop mirror re-silvered when necessary according to nineteenth-century techniques. An extraordinary aspect of its operation is the focusing of its projection, which is required each time the mirror is tilted to shift its view from near to far. The operator will gentle lift or lower the screen, enabled by a sophisticated yet relatively robust system of gears and counterweights underneath. Built in the attic of an old windmill, tight quarters require that the table be smaller than the projection. However, what otherwise might seem a restriction becomes an asset when its guide supplies visitors with white paddles to catch the parts of the image that extend beyond the screen. Dumfries also keeps white three-dimensional pieces that they place on the table to disrupt projections. In other words, exhibitions at the nearly two-centuries-old device indicate the potential for screen play in Maria’s day.

There is no question that guides at Dumfries and Edinburgh enliven and engage their audiences, yet I wonder how much encouragement is necessary to convince someone to interact with a splendid camera obscura? Unlike the arrangement of modern cinemas, viewers normally stand at the edge of the screen with the picture, controls and its operator well within reach. The temptation to touch may already exist. The Clifton Observatory in Bristol installed in 1829 by an artist named William West is a self-operated device that obliges viewers to make their own

virtual tour. Hanging from a ceiling track above the screen, the handle that rotates the camera must be passed from one viewer to another or moved by someone circumnavigating the table—its wooden frame and unplastered surface being precautions against wear from the contact and caresses of unsupervised visitors. During my haunting of the Bristol device, I observed more unsolicited and varied interaction than at Edinburgh or at Dumfries. While no one thought to catch the projections with makeshift paper screens, perhaps emboldened by the absence of staff, visitors openly conversed, took pictures of themselves and the table, pointed to sites of interest, and walked around, taking turns at the controls, sometimes manipulating them to follow the people outside and below (18 July 2015). Perhaps they thought, like me, how like an interactive installation, a surveillance drone, a digital touchscreen.

Touch-screen

There is tactile and illicit pleasure in disrupting the illusion of a splendid camera obscura. Yet, or perhaps because, for well over a century (before the advent of tablets, smartphones and other haptic displays), it was unacceptable to touch a screen. Parents, teachers, and other AV supervisors instructed twentieth-century viewers like me to "Be careful of the silver screen!" and "Move away from the television!" and "Don't touch the computer monitor!" In the early days of cinema, to do so was to be a naive "country rube or yokel" like *Uncle Josh at the Moving Picture Show* (1902) who drew laughter for his ignorance of the conditions of projection (see Strauven, "Early Cinema's Touch(able) Screens" n.p.). In a subgenre of rube films, unwitting rural bumpkins interact with movie screens because they do not understand how the cinema works, and because their interference always results in disaster, film theorists generally understand them as self-reflexive and didactic works that draw attention to cinematic artifice, while training movie-goers how to behave (Ibid). With this lesson internalized alongside parental warnings to "not sit so close to the television, you're going to go blind!" (M. Loader 1970-1980), the reluctance or enthusiasm of a modern visitor to accept an invitation to play with a projected image may come from an association of a splendid camera obscura with the cinema and the cinematic prohibition. The connection is understandable. A cinema-goer still

able to recollect visits to splendid camera obscura exhibitions from the previous era equated the two experiences in a 1935 newspaper article, recalling,

> You paid your penny, entered a darkened building, and looked down on a horizontal, circular screen. Then a system of lenses above the screen was set in motion and threw down an image, in natural colour, of all that was taking place outside, on the sands, the promenade, and so on. This may not sound very exciting, but just as it is in the cinema to-day, everything appeared on the sheet "more real than the real thing." ("The Distant Cousin", *Yorkshire Post and Leeds Intelligencer* 13 June 1935).

Wanda Strauven argues that by early cinema, the prohibition against touching the screen was already in place. Spectators may have still felt the urge to touch the screen, but she proposes that the impulse to touch and the no-touch rule had earlier roots. She discusses early aesthetic debates about the importance of touch, makes note of the haptic qualities of optical toys and hand-cranked devices, and even identifies the tabular screens of camera obscuras as pre-cinema "touchable" screens. However, her recognition of the history of touch in museums merits special attention because it further relates to the history of Short's Observatory.[152]

According to Constance Classen, in the transition from private cabinet collections to public museums, it was not unusual for the curator of an early museum to act like a "gracious host" treating visitors like "polite guests," who in turn expressed "interest and goodwill by asking questions and by touching proffered objects" (138). She explains that reasons for touching were "wide ranging" (Ibid, 139). Handling an object facilitated further investigation through interactions that may engage other senses, and helped verifications of authenticity through weightiness. By the mid-1840s, that practice of touching artifacts and artworks had ended as a "direct result of the institutionalization of the museum and the disciplining of the museum visitor" (Strauven, n.p.).

Nevertheless, this history recalls Short's Observatory and the challenges it faced on Calton Hill. It suggests that potentially interactive shows of its camera obscura would have belonged to a program of related hands-on exhibitions of the other instruments offered by Maria Short. Her project may then be situated as an alternative, transitional enterprise, since it developed in the decades between the domination of private collections owned by individuals and exclusive

societies such as the Astronomical Institution (1814-1839), and state-run museums like the Industrial Museum of Scotland (now National Museum of Scotland) founded as a government institution in 1861.

As its pamphlets, newspaper notices and handbill suggest, alongside its splendid device, visitors to Short's Observatory could see, touch, and look through telescopes, microscopes and the various other optical and scientific instruments it displayed. Although its promotions emphasized the educational aspects of her displays, not everyone recognized her project's potential as a small but immersive and interactive science museum that might uplift the public with hands-on learning. Cockburn had supported the opening of the first Mechanics Institute, the School of Arts of Edinburgh, which belonged to a reform-minded and "emerging philanthropic and humanitarian movement to bring science to the working classes" (Griffiths *Shivers* 183). However, he and other Short's other opponents may have feared that her popular observatory, as a commercial establishment that was open to anyone for a single shilling, would draw the impolite and the unruly. Like the curators described by Alison Griffiths, Short's naysayers likely dreaded the "gapers" who supposedly attended museums "in search of the spectacular and little else," and the loutish "gawkers" who going to "see a show" spurned educational uplift and museum-appropriate behaviour (Ibid, 169-170). Recall that even the Great Exhibition, presided by His Royal Highness Prince Albert, earned Cockburn's scorn for being "Vulgar!" (*Some Letters of Lord Cockburn* 66).

In *Art, Museums and Touch* (2010) Fiona Candlin explains that while the instituting of public museums obliged the establishment of no-touch policies to preserve their collections from "tens of thousands visiting in a week", the tactile accessibility of objects associated with earlier projects had never been evenly applied (85). Candlin argues that while British empiricists recognized touch as a rational means of investigation, it was rarely, if ever, a privilege afforded to non-elite museum visitors (69-77). Despite long held concerns regarding visitor behaviour that featured in debates about broadening access to museum collections, and which continued after the institution of public admittance to several British institutions, "Select Committee Reports of the 1830s, 1840s and 1850s all commented on the singularly *good* behaviour of the

working-class visitors, stating that nothing has been damaged or stolen (original emphasis, Ibid 81).

It may be possible to attribute the disciplined behaviour of working-class visitors to the "exhibition complex", the phenomenon posited by Tony Bennett in his 1992 study of museum history, *The Birth of a Museum*. Bennett explained that the design of public museums, opened in the mid-nineteenth century, paralleled but inverted the spatial development of the Panopticon. While incarceration enclosed and hid the previously public spectacle of punishment, the museums exposed the formerly private collections once accumulated for the pleasure of the elite. Identifying both the prison and the museum as forms of Foucauldian disciplinary or governmental power, which "is characterized by a multiplicity of objectives" that are not from "some unifying centre principle of power such as the sovereign" (22), Bennett contends, "The museum had to be refashioned so that it might function as a space of emulation in which civilised forms of behaviour might be learnt and thus diffused more widely through the social body" (24). In other words, exhibition architecture also placed the visitors on display so they could see each other, a condition that enabled what Andrejevic calls "lateral surveillance."

The prejudices against working class museum visitors nevertheless seem unfounded given that other factors, such as urban environmental pollution (in effect, chimney smoke) posed a greater threat to treasures like the paintings at the London National Gallery (Candlin 82-3). Working class patrons, especially those employed in the service of wealthy households, would likely understand the importance of taking care around precious things. Select Committees were more concerned about the "appalling behaviour of the English upper classes particularly on their cultural travels" and attributed their careless disregard for objects to their Protestantism and its lack of religious relics (Ibid 81). It was a weak excuse given that the English working class were also Protestant, and other Protestant countries worried less about protecting their collections. Samuel Laing, the Scottish travel writer who condemned the removal of Short's Observatory, prefaced that topic by marvelling at the access to its objects that the Thorwaldsen Museum in Copenhagen had accorded him during his 1851 visit.

Discussing his Danish museum visit while criticizing the manners of his countrymen, he remarked:

> Small articles, such as coins, medals, seals, are under glass cases, but are taken out, if desired, for closer inspection. How long would such a collection remain unmutilated and undamaged in Edinburgh, if the public, and persons even far above the lowest class, had equally free access to it? The finest statues and models would be tattooed with the initials of all the clerks and apprentices in Edinburgh, or wantonly deprived of toes, features, or limbs. The Scotch Athenians have still the itch in their finger ends, and cannot refrain from touching, rubbing, and handling (392).

Paying attention to bodies and physical interactions inside splendid cameras obscura, as well as within popular representations, enriches and problematizes histories that conflate all experiences of camera obscuras with a "motionless, bodiless, vacant gaze cited by Metz" that scholars of cinema already recognize as "oversimplified and ahistorical" (Williams, *Viewing Positions* 3). While feminist and postmodern scholars describe early and proto-cinematic spectatorship as multiple, mobile and embodied—doing much to undo apparatus and gaze theories that posit the spectator as a disembodied ideological (and male) subject—little has challenged the association of the observer inside the camera obscura with notions of de-corporealized and passive vision derived from spatial separation and the supposed limiting of sensorial stimulation and embodied interaction. However, a close examination of its nineteenth-century walk-in variation reveals corporeal engagements and pursuits that are tactile, as well as visual—surveillant and voyeuristic—pleasures. Nevertheless, instead of simply refuting the theory by Jonathan Crary that identified the camera obscura with the seventeenth and eighteenth century, it might be plausible to suggest that the apparatus itself transformed to become a more embodied device and so contributed to the rupture that shifted from one dominant understanding of vision to another. As such, it may be more readily positioned, alongside other nineteenth-century optical media and studies, as a participant in what Linda Williams calls the "frenzy of the visible"—the co-constitutive pre-cinema and pre-hard-core logic of *maximum visibility* that articulated new knowledge of bodies and pleasure with power (*Hard Core* 48). But, let's return to Short's Observatory and the women that, alongside Maria Short, operated the Edinburgh splendid camera obscuras, in search of other more willful

practices. Why and how could those devices disrupt dominant understandings of space and vision? Did they manipulate periscopic eyes into spinning baroque visions, and what more might they have revealed with their touchable screens?

V. The Wash

Calton Hill beauties

> *The Calton Hill is the glory of Edinburgh. It has excellent walks; it presents us with the finest of prospects both of the city, its vicinity, and the distant objects ; and it is adorned by beautiful buildings, dedicated to science and to the memory of distinguished men. The monuments of Stewart, and Playfair, and Burns are there; —the High School; the Astronomical Institution; and that striking fragment of the Parthenon,—begun to be revived on a site nobler than that of the original,—and which I can never permit myself to doubt that some future generation will complete. And there is nothing at present to degrade. That sacred mount is destined, I trust, to be still more solemnly adorned by good architecture, worthily applied. So as the walks, and the prospects, and the facility of seeing every edifice in proper lights, and from proper distances, be preserved, and only great names, and great events, be immortalized, it cannot be crowned by too much high art (Cockburn, "A Letter to the Lord Provost" 13).*

In October 15, 1849, less than six months after the opening of the splendid camera obscura in Nelson's Monument and less than a year before the removal of Short's Observatory from Calton Hill, Lord Cockburn published a pamphlet called, "A Letter to the Lord Provost on the Best Ways of Spoiling the Beauty of Edinburgh." Ten days later, Cockburn wrote in his journal, "If, as seems probable, publishing a pamphlet be one of the signs of insanity, I am mad," but having no regrets, he concluded the entry by remarking, "It has at least excited attention, and may do some practical good" (*Journal Volume II*, 249). Observing that "there is probably not one stranger out of each hundred of the many who visit us, who is attracted by anything but the beauty of the city and its vicinity" ("Letter to the Lord Provost" 6), Cockburn called for the preservation of Edinburgh—its ancient architecture, trees and overall appearance, itemizing several past and potential degradations in an effort to raise public spirit and public taste. What immediate effect his pamphlet had is not examined here, however it is worth noting that his outspoken concern for civic beauty eventually resulted in the 1875 founding of the Cockburn Association in his name. Its continued purpose is to preserve and improve the city of Edinburgh

and one of its earliest members was Patrick Geddes, who bought and refitted Short's Observatory on Castlehill.

The citation above indicates how Cockburn's pamphlet paid special attention to Calton Hill as evidence of the City's good looks. As noted throughout this text, the appearance of the Hill had long concerned the Solicitor General. For example, in July 1828, while writing about plans to erect a monument to the recently deceased professor of mathematics Dugald Stewart, in his journal, Cockburn mused that the notion of leaving Calton Hill to "what is called nature" would be to forsake it as "waste ground for blackguards and washerwomen" (*Journal Volume I*, 422). He concluded, "The silent beauty of architecture, if consecrated to great names, would make that eminence the noblest cemetery of immortals in Europe, but no edifice connected with common habitation ought to be permitted" (Ibid). Written just over two decades later, Cockburn's 1849 pamphlet returned to the subject of Calton Hill, but despite his earlier public protest against its establishment, he made no mention of Short's Observatory or complaints about the aggressive solicitation that had resulted from the rivalry between them and the exhibitors at Forrest's Statuary and Nelson Monument. If Cockburn noticed any of Short's activities after 1834, no record remains. Nevertheless, given that Cockburn addressed his pamphlet directly to the Lord Provost (William Johnston), it is possible that at least some on Town Council considered his concerns for the appearance and proprietary of Calton Hill as they struggled to resolve the problem of Maria.

On December 24, 1849, less than two months after the publication of Cockburn's pamphlet, the Dean of Guild appointed Peter Logan as the new uniformed Guide to Strangers for Calton Hill to replace and guard against solicitation by exhibitors (primarily Short's) and help the police "keep the Hill free from improper characters" (Appendix F). In a Town Council meeting that followed, Short's refusal to contribute to Logan's salary caused the Dean of Guild to refer to her (or the trouble she caused) as a "vexatious subject, with which the Council had been troubled for years" and for her "failure to comply with Council for the management of Calton Hill" promised to make a motion to remove Short's Observatory ("Town Council Proceedings" *Caledonian Mercury* 21 February 1850). It was ousted that September.

But was Short's Observatory responsible for the troubles that caused its eviction? In June 1850, the motion to evict Short's Observatory followed a report by Logan that "parties connected" to it had "violated" Council rules ("Town Council Proceedings," *Caledonian Mercury* 13 June 1850). Councillor Ridpath demanded the Guide present evidence to support his Guide's claim and,

> He asserted that the movement against Miss Short arose from a conspiracy against her, and that Mrs. Kerr [sic] of Nelson's Monument was in the habit of visiting certain Councillors and relating stories to them, which they believed.

Perhaps Ridpath also thought suspicious the timing and placement of the Kers and the splendid camera obscura in Nelson's Monument. The Astronomical Institution's suppliers, Adie and Son completed the installation in supposed secrecy, accomplishing what Short and Henderson had proposed years earlier. Post Office Directories for Edinburgh and Leith from 1848-49 to 1863-64 list Mrs. Ker or Kerr at Nelson's Monument, and not Thomas Ker, the original lessee, suggesting that it was she who occupied the site and managed its exhibition. That Mrs. Ker may have turned Town Councillors against Short's Observatory indicates her presence as another willful woman with a camera obscura at work on Calton Hill. Moreover, a newspaper report from 1856 raises the question of whether the Guide to Strangers, Nelson's Monument and Forrest's Statuary themselves followed the new rules for the hill that had been initiated due to Short's behaviour and which she allegedly broke. A complaint against the Calton Hill guide and remaining exhibitors appeared in a newspaper the year after Short's Observatory reopened on Castlehill and just months after the Falkirk Herald reported that the new Short's had entertained a large party from the annual excursion of about 2000 iron workers from Falkirk, "not withstanding the price of admission," because they were "very much interested in the wonders of the solar microscope and the electrical machine" (*Falkirk Herald* 31 July 1856).

In a letter to the editor of the *Caledonian Mercury*, "The Calton Hill Victim!!!" opened by stating, "As the visitor ascends the Calton Hill he will find—not a tree—but a parasite, who at once seizes upon the victim" ("Correspondence" *Caledonian Mercury* 23 Oct 1856, 3). The correspondent "Verdant Green" then described being accosted by the "volunteer guide," taken to both Nelson's Monument and Forrest's Statuary, and obliged to spend a total of 4 shillings

on admission to two exhibitions and a gratuity for the guide. After paying one shilling at the monument and looking at a "series of paltry penny show caricatures," the victim reported,

> The camera obscura is the succeeding treat. The 'young leddy' indulging in facetious remarks on 'women drying clothes on yon hill of a windy day, and twa lubers a-walking', finishing by displaying her own precious limbs and her dog Toby on a particular stone. (Ibid).

While the veracity and motive of the Calton Hill victim's report are also suspect, the information it contains is nevertheless noteworthy. By disparaging the quality and decorum of the Calton Hill guide and exhibitions, it makes Short's Observatory appear like an innocent victim to inferior rivals. Yet even if the letter was planted for just that purpose, the criticisms of Forrest's Statuary and Nelson's Monument may have had some foundation. J.A.H. Macdonald, who in his memoirs recalls Short's Observatory on Calton Hill as a "mean wooden erection," "farcical," and a "sorry affair," describes Forrest's Statuary as "hideous and discreditable, and the contents were unworthy to be provided with accommodation on our classical hill" (200). In 1865, Scotsman reported that Mrs. Forrest "the proprietrix of the statuary," requested that Town Council allow her to "continue the exhibition for some time longer" (31 May 1865). One member stated that "it had been understood that this exhibition, which was an ugly eyesore, should be removed for a long time past," while another claimed "it made them [the City] a laughing-stock to strangers who visited the hill" (Ibid). *The Scotsman's* response to Forrest's continuation? "Oh, oh" (Ibid). In other words, Calton Hill may have been replete with the occupation of willful women.

As for Mrs. Ker's exhibition at Nelson's, aside from the Calton Hill Victim and a single advertisement in 1852, little evidence of its presence appears between the year it opened (1849) and the year it was struck by lightning (1863). Mrs. Ker may have stopped exhibiting or else her show drew too little notice to be press worthy. Still, the presence of Mrs. Ker and a "young leddy" guide indicates that, alongside Agnes MacArthur in the Gothic Tower and Maria Short in Short's Observatory, women operated all three splendid cameras obscura on Calton Hill. Counting Short's Observatory on Castlehill, and with Dolly as a partner in the 1823 Holroyd

display on the Mound, it appears that every splendid camera obscura that overlooked nineteenth-century Edinburgh was manned by a potentially willful woman.

Scottish Washing

Along with its mention of the "young leddy" at Nelson Monument, and its criticism of Mrs. Forrest's venue, it is also curious that the Calton Hill Victim belittled Mrs. Ker's exhibition by drawing attention to its voyeuristic qualities. Aside from Toby the dog, the three sights displayed at her screen were of a sexualized nature—the "lubers" (or lovers) walking on the hill, the "precious limbs" of the camera operator, and finally the women drying clothes on the hill. As earlier discussed, representations of splendid camera obscuras often depicted the surveillance of trysts and imagined attractive young women inside their dark rooms. The allure of the "Scotch washing" is another trope. Highland women traditionally did their laundry outdoors in groups or pairs by stamping it with bare feet in tubs of water, and eroticized representations of the practice circulated anecdotally, and in illustrated and photographic representations from the eighteenth century onwards. Using their full body weight and minimizing the loss of circulation caused by wintry temperatures, made Scotch washing an efficient laundering method, as well as a cheerful, social occasion; women supported one another physically and sang as they stamped (Davidson 140). However, after John Slezer drew an image of the practice in the foreground of "The Prospect of ye Town of Dundee from ye East" for the first edition of his *Theatrum Scotiae* (1693) the sight of Scottish ankles, calves and knees became an image that shocked and titillated sightseers (figure 28). In her survey of British housework, *A Woman's Work is Never Done*, Caroline Davidson notes, "Foreigners tended to suspect that they washed in this way for lascivious reasons (it was after all, rather immodest to show so much leg in public)" (140).

Of course, illustrators and photographers made images of Scotch washing for lascivious reasons. Their pictures do not show women working, but rather posing—skirts hiked high. A hand coloured etching by Isaac Cruikshank in 1810, owned by the British Museum appears in its online collection with the following description:

> Two buxom young women, lifting their petticoats high, trample in tubs placed beside a Highland stream; another brings a basket of linen to be washed, while a girl in the background spreads linen on the grass to dry. A young woman stands in the stream splashing a laughing man with water, using an oar. There are several versions of this subject (figure 21, Museum no. 1935,0522.7.22).

"Washerwomen on Calton Hill," illustrated for M.E. Egerton for *Airy nothings, or, Scraps and naughts* (1825), depicts another Scotch washing (figure 20).[153] The women posing in the photographic Valentine's postcard "A Highland Washing" (1878) reproduced in *Scottish Women, A Documentary History, 1740-1914* (co-edited by Esther Breitenbach et al.), as contributor Linda Fleming observes, "do not look to be enjoying the experience" (109). Explaining how the process draws attention to, while washing away, the sweat and fluids of the body and its activities, Aritha Van Herk writes,

> Of course, because laundry deals with the most private and suggestive articles of apparel, it rubs elbows with fetishism. Further, the physical situation of women washing [near water and in isolation] has traditionally been seen as a site of opportunity (897).

Van Herk thus argues that laundry had always been associated with eroticism and shame, and being an activity always associated with working women, its appearances within discursive views of splendid camera obscuras supplement and stand in for the slut-shaming images of couples *in flagrante delicto*.

Old Town

> *How the 'Beauties' of Edinburgh can have given Lord Cockburn such grave cause of offences, we cannot form the most distant idea […] We have not seen the letter, and have no wish to do so, except to see it burned by the hands of the common hangman so that we are ignorant of the nature of his Lordship's proposed treatment of the fair sex (*The Scotsman*, 31 Oct 1849).*

Before concluding his published 1849 address to the Lord Provost, which insisted that the "beauty of the town is paramount to every other consideration" ("Letter to the Lord Provost" 26), Lord Cockburn turned his attention to the prospect of laundry on the Calton Hill. He wrote,

> The Calton Hill, rescued, a few years ago, from one pollution, has, within these few weeks, been doomed to another; which, though comparatively slight, and humanely mean, it to be greatly regretted. A part of its higher ground has been set aside for a *public washing green.* Not for a mere drying-field; which the hill has always been, —which only requires air and sun and grass;

> but for both drying and *washing*. What does this imply? It implies water led to the place artificially; consequently pools; rows of posts, seldom perpendicular; lines of ropes, rarely tight, always broken, and never well-tied; rows of worn-off turf, that is, of splashy mud, below these lines; stones, to keep what is spread out steady; articles, whether spread out or hung up, not suggesting pleasing reflections; fires, scorching the turf, and leaving their ashy residues; inverted tubs, on which sit, or thin yellow blanket, under which cower, the decorous matrons and timid virgins who watch the habiliments;—whose eloquence let no prudent passenger provoke. No one can have a stronger desire that I have for the comfort of the lower classes; for whom scientific washing-houses ought to be provided. But it is not inconsistent with the sincerity of feeling, to express a doubt whether the Calton Hill be a proper place for this exhibition (Ibid 23, underlined emphasis added).[154]

Here's a question: Was Cockburn imagining Highland knees when he wrote about "decorous matrons and timid virgins" as part of an "Exhibition"? Here's another: Why would Calton Hill become a washing-green?

Reverend Dr. James Begg of the Free Church of Scotland took exception to Cockburn's pamphlet and nine days after, on October 24, 1849, he responded by publishing his own called "How to Promote and Preserve the True Beauty of Edinburgh, being a Few Hints to the Hon. Lord Cockburn." Begg criticized Cockburn's elitism by insisting that public spirit could only be achieved through the restoration of public rights. Writing that he expected "in virtue of old associations" [reformers and Whigs]…the most liberal principles in regard to the people at large," Begg attacked the ideals propounded by the Solicitor General for being built on "an exclusive and selfish basis" (6). Whereas Cockburn mourned the decision to not rebuild the old church that had been disassembled for the railway, Begg focussed on its £16,000 cost and contrasted the project with the City's lack of working-class access to decent housing, public land, and hygiene (4). For example, in condemning the shutting of public parks and gardens, he opposed Cockburn's assessment of Princes Street Gardens as "justly enclosed," by challenging the judge's recollection of its previous state as a dumping ground for "skinned horses, hanged dogs, etc.," and by quoting an extract from a judgement from that Cockburn himself had given in a case against land seizure (6-8). However, it was Cockburn's anxiety over a potential washing-green on Calton Hill that drew the most attention from Begg.

Having consulted with members of Town Council, Begg explained that the proposal in question was to facilitate access to water for bleaching—achieved by laying wet linen out to dry in the

sun—and that Cockburn's fear was otherwise unwarranted.[155] Caroline Davidson explains the practice as follows:

> After the laundry had been beetled or trampled, it was wrung out and laid on the grass or a convenient hedge to dry. There the sun's rays helped to whiten the linen further, and the end results were usually quite creditable. Mr. and Mrs. Samuel Carter experts on Irish domestic life between 1825 and 1840, thought that the beetling was one of the most effective modes of washing they knew, and even the sternest critics of the Scots' alleged *sluttishness* [sic] usually gave them credit for clean linen (140, emphasis added).

Begg made no mention of the propriety of outdoor washing in Scotland and instead took Cockburn's concern as an opportunity to promote the opening of the Meadows and Queen's Park, and the dire need to improve the living conditions of the poor in Edinburgh (12). Begg referred in particular to Edinburgh's Old Town and cited an American's impression of the High Street (the west end of which soon after became the location of the second Short's Observatory), as having "such receptacles of filth and laboratories of 'villainous smells,' which come up from these damp dark lanes" (14). Commentators frequently cited its stink when describing the depreciated state of the nineteenth-century city, which resulted from crowding due to rapid urbanization, poverty, and its neglect by wealthier citizens who had abandoned its oldest area for modern ones like Edinburgh's New Town. T.C. Smout asserts that, "the true grimness of the Scottish town, however was concealed from the tourist round of monuments and shopping centres" and explains that the 1861 census revealed that "64 per cent of the entire population lived in one- or two- room houses" (*A Century of the Scottish People* 33). He writes,

> In the middle decades of the nineteenth century, as in the 1840s, the Scottish city continued to be recognized by public opinion as a crying scandal of poverty, bad housing and ill-heath. As the [London journal] Builder of 1861 said of Edinburgh, every visitor will carry away two impressions, 'a sense of its extraordinary beauty and a horror of its unspeakable filth' (40).

Smout continues his characterization of Old Town by citing the *Builder* description that again uses smell to emphasize its squalor—"a diabolical combination of sulphurated hydrogen" with no European or Asian "equal in depth and intensity, concentration and power" (Ibid). However, Begg used the need for spaces to do laundry to transform a critique of poverty into visible and

aesthetic terms that an ocularcentric elite obsessed with beauty might better understand. He explained:

> Man is not in his natural state when cooped up in a city and a poor man's house, on a washing day, is any thing but comfortable. It is absolutely necessary, for sanitary purposes, to have large open spaces of green grass with abundant water for the use of the people at large. The public taste must not only be tutored to tolerate this, but to admire it as a lovely moral spectacle, and to deprecate the opposite state of things. Now a vast portion of the public grounds of Edinburgh has been squandered and sold by wicked rulers in former times. And instead of giving the people the remainder, they have been hemmed in on all sides—driven from the public parks—driven to hang their clothes on poles in closes [narrow alleys]—driven, like men at the flood, to the very roofs of the houses. Your Lordship, with your keen eye for the picturesque, expresses no horror at the spectacle of clothes fluttering from windows, and hung out on roof, to the imminent danger of life and limb (11-12).

Chances are that Cockburn took no notice of laundry hanging from the windows of Old Town or never thought about what wet linens might signify beyond denoting the presence of labour or the labouring classes.[156] Yet once alerted to the need for washing and the need for the space to do it, signs of the practice appear everywhere. That awareness would be especially keen if your family (with maybe your lodger) occupied a one-room windowless flat in a crowded city plagued by air pollution and damp weather, and you needed to appear sufficiently fresh to maintain your job. Caroline Davidson explains that washing was essential to British households of all classes from the mid-seventeenth century onwards despite challenges like access to water, space and high taxes on soap (136).[157] For example, a London working class family in 1844 would spend approximately half of what they spent on housing to wash their clothing, whereas a middle-class family would spend about a third (Ibid). Performing that task would be a woman from the family, a female servant or a washerwoman. British men never did laundry, unless "there was something wrong" (he was a fool, simple-minded, or terribly henpecked) and the taboo was so strong that poor widowers who could not afford hired help would clean the family's clothing in secret (136-37). Otherwise, there was likely no shortage of women to wash the linens. In eighteenth- and nineteenth-century Edinburgh, "domestic service was far and away the largest employer of female labour" (Devine 39).

Lord Cockburn's servants probably washed the soil from his clothing and bedding in the basement and back of his house, and if his wife and housekeeper were good household managers, the judge might not have taken much notice of the process. Van Herk avers,

> Dirt's banishment is a mysterious enactment, laundresses over time practicing an obscure if challenging magic. In just this fashion have women in domestic service been relegated to the back door, their presence and their work erased to serve appearances, socioeconomic considerations, and sheer snobbery (894).

The impulse to hide the laundry is significant to the history of the splendid camera obscura, of Calton Hill and Maria Short, and not only out of a coinciding of concerns related to gender, vision, and urban space. Remember the Astronomical Institution almost fired the keeper of their camera obscura, Agnes MacArthur following the death of her father, which would have left Agnes and her mother homeless and unemployed. The investigation found the MacArthurs faultless in all but one sense—the visibility of their laundry offended good taste, so they were obliged to promise to hide it. Decades earlier, the family who first occupied the Macarthur home—the Gothic Tower—were far less fortunate when sensibility and linens came into play. Had James Douglas and Robert McLean not prevented Margaret Robertson and Maria Short's sister from washing the bedding, perhaps Jacobina Downie might never had made her fateful raid. The recent widow and new mother had already quit Calton Hill with all of the family's belongings, when she decided to attack her old house and its new occupants. The only thing her trial records happening between her departure and raid is her servant and daughter being dismissed from their task for want of propriety on Thanksgiving day. Holiday or not, when the sun is shining and time and space permit, the laundry must be done! And if Barker's panorama documented the life that Jacobina was forced to give up, then it also shows Margaret Robertson watching over the family's whites spread out on Calton Hill.

After Barker, Calton Hill and its outlooks attracted numerous artists in the early nineteenth-century, such as J.M.W. Turner in 1819 (figure 22), Mary Stewart/Lady Elton in 1823 (figure 23) and Thomas Hosmer Shepherd in 1829 ("The Jail Governor's House" in *Modern Athens*, 77). All depicted laundry there in ways quite unlike the satirical, eroticized images of Scotch Washing. Their work is closer to "The Laundress" (1761) by Jean-Baptiste Greuze or "La repasseuse"

(1904) by Picasso, which Van Herk describes as "emblematic of artists making laundresses the object of their gaze but consequently romanticizing their toil" (896). It is unlikely that men like Greuze, Picasso, Turner or Horner, or gentry like Lady Elton did their own laundry—so their perspectives might have been closer to James Nasmyth, who in his autobiography recalled,

> One of my greatest enjoyments when a child was in going out with the servants to Calton, and waiting while the 'claes' bleached in the sun on the grassy slopes of the hill. The air was fresh and bright and pure. The lassies regarded these occasions as sort of a holiday.
>
> The women brought their work and their needles with them, and when they had told their stories, the children ran about the hill making bunches of wild flowers — including harebells and wild thyme. They ran after the butterflies and the bumblebees, and made acquaintance in a small way with the beauties of nature (72).[158]

Numerous photographic images of laundry in nineteenth-century Edinburgh exist that are neither romantic not erotic. The wet clothing and linens might be easily overlooked since attention is normally focussed on city architecture and its overall appearance. For example, look closely at the oldest extant Scottish daguerrotype attributed to Short's camera obscura maker Thomas Davidson (figure 9). In his image of Calton Hill, not only can you make out the silhouette of Short's Observatory on the far side of the National Monument, you might also notice white sheets laid out in front of the Royal Observatory. With so much laundry seen there in the 1840s, why the Astronomical Institution obliged the Macarthurs to hide theirs is difficult to countenance.

Additionally, there are calotypes of Old Town photographed by Thomas Keith from the first half of the 1850s (figures 24-26). They depict the top of Short's Observatory on Castlehill in the first years of its construction, along with the aging and soot-stained architecture of the nearby Lawnmarket, Castle Wynd, Grassmarket, the West Bow (Victoria Street), etc. Long exposure times (a requisite of early photographic chemistry) meant that most people and vehicles moved too rapidly for Keith's camera to capture, and except for a few figures, the city appears deserted. However, bright, oddly-shaped flags adorn windows, horizontal poles and fence posts and so signal its habitation. Look again, and you see they are sheets, skirts, shirts and pants some blurred by blowing in a breeze. It could be argued that young Dr. Keith purposely

documented living conditions in Old Town out of concern for its hygiene, anticipating the 1860s and 1870s photographs of laundry in Glaswegian slums by Thomas Annan. Similarly, photographs by Archibald Burns published in the 1868 tourist guide, *Picturesque Bits of Old Edinburgh,* also feature clothes hung out to dry (figure 27). Although it seems somewhat unusual for a tour guide, its commentary by writer Thomas Henderson acknowledges,

> One gets somewhat reconciled to the loss of the picturesque, if thereby a better sanitary condition could be induced; and it takes the utmost stretch of the imagination, when looking at such hovels, and their present inhabitants, to conceive of them as the abodes of the gay, the beautiful, and the noble of other days (43).

Such images operate as social commentary and evidence the paucity of living space in Old Town. In *Picturesque Bits*, Henderson moreover notes that the 1861 census revealed "1500 rooms are the abodes, day and night of from five to fifteen persons" (Ibid). Smout observes that the average size of those one-roomed dwellings was 14 feet by 11.5 feet (*A Century of the Scottish People* 34). Imagine that, five to fifteen people in that one room. As a relatively new structure on the Castlehill end of the High Street, did Short's Observatory offer better conditions for its tenants? Their page in the 1861 Census suggests that their building—549 Castlehill—had multiple dwellings. All appear to have one or two windows (Smout tells us that 1 percent of Scottish families lived without windows, Ibid 33), and the only flats with more than five occupants housed only six, including two children aged 1 and 2. That's not to position Short and Henderson as charitable—for unlike Geddes's Outlook Tower, which succeeded it—Short's Observatory was always a for-profit business. However, it hardly made them rich as evidenced by the rental notices placed in *The Scotsman* on September 16, 1860 and February 27, 1861. Unable to repay the building loans, the business nearly failed. The 1861 census also reveals that Short and Henderson lived in the tower in a dwelling that had just one window.

While their window would have provided air and light, If Short or Henderson wanted to see the city, they could enjoy excellent prospects from their rooftop or watch the urban hustle on the sheltered screen of their camera obscura. That it showed the laundry of their neighbours, among other scenes, is probable given the observation in the following century that "the same old washing flutters on the same old line and was pointed out with even more than the same

old candour" (*The Scotsman*, 16 May 1947). That the "young leddy" with precious limbs showed "women drying clothes on yon hill of a windy day" indicates that laundry might have always been featured in the exhibition of an Edinburgh camera obscura ("Correspondence" *Caledonian Mercury* 23 Oct 1856, 3). There is good reason for that. Consider again, why washing constantly appears in images of the city. Artists, photographers and washerwomen all operate best on sunny days when the air is clear. The same is true for a camera obscura.

The splendid camera obscura and the building that Maria Short constructed on Castlehill became integral to efforts by Patrick Geddes at the end of the century to study and improve urban life. As mentioned previously Geddes belonged to the Cockburn Association, and as a follower of Thomas Carlyle, carried similar notions of tower-top visionaries, whose abilities to visualize came from combining insight with synoptic vision (Ponte and Levine, 48). Geddes advocated that every "town museum" have a tower with a "synoptic view," because "statistics, research and data provided by various sciences must be integrated and reread in light of a real vision of the urban panorama" (Ibid 52). Nick Burton and Hillary Fraser explain Geddes application of the splendid camera obscura as an epistemological training device for sociological urban laboratories and that represented yet another kind of deployment for the apparatus:[159]

> The [Outlook] Tower was so called because Geddes wished visitors, as part of the museum experience, to see the reflected moving image of the city and the countryside beyond afforded by the Camera Obscura it housed, and also to experience the direct panoramic view of the immediate environment from the Prospect roof situated around it. But they were also encouraged to meditate upon and internalize in an individual way what then had seen and learned collectively, by spending a period of reflection in a darkened "Inlook Room," that contained only one chair, before descending the Tower (146).[160]

Geddes's program indicates the potential for a camera obscura exhibition to also provide social commentary about the state of Old Town. But let's remember that for much of the history of splendid camera obscuras in Edinburgh, women controlled the devices. A stereoscopic pair by Thomas Begbie depict laundresses and their linens in front of the Calton Hill Observatory wall and the Gothic Tower (figure 29). Taken some time in the 1860s, the photographs demonstrate

that despite decades of promoting of Calton Hill as an elite space, which included efforts to keep laundry hidden, the washer women never left. The pictures reveal occupation by women—practice and habitation—in an unromantic, unsexy and unapologetic way. Willful women. Willful women at work on the Acropolis. Is that what the other willful women on Calton Hill, revealed with their splendid camera obscuras?

Concluding Misses

> *We come now to the last form of heroism; that which we call kingship. The commander over men; he to whose will our wills are to be subordinated, and loyally surrender themselves, and find their welfare in doing so, may be reckoned the most important of great men. He is practically the summary for us of* all *the various figures of heroism; priest, teacher, whatsoever of earthly or of spiritual dignity we can fancy to reside in a man, embodies itself here, to* command *over us, to furnish us with constant practical teaching, to tell us for the day and hour what we are to do (original emphases, Carlyle* On Heroes *185)*

Edinburgh's Camera Obscura is unique for being founded by a woman, and its emergence during an era of epistemic, economic and social change enriches histories of optical media and the development of science as a discipline by demonstrating alternative applications and participation by actors that are frequently overlooked. Archival sources and extant sites made possible this investigation of Short's Observatory and its founder Miss Maria Short, and through them, a more general study of nineteenth-century popular observatories, splendid camera obscuras and their roles in the transformation of the modern western world. Nevertheless, the relative lack of scholarly attention paid to their installations and origins is all the more noteworthy given their ongoing presence in plain, and moreover promoted, sight.

Short and her venues operated at the centre of a university town, steeped in historical narratives of enlightenment and scientific spectacles. However, the presence of women in those stories is exceedingly scant. They celebrate no Scottish Austens, no Highland Brontës, nor Glaswegian Gaskells, and not even a Lowland George—Eliot or Sand. Yet Lord Cockburn and Thomas Carlyle keep company with legions of other influential and notorious men who famously made Edinburgh their home during the lifetimes of Maria Short and the generation that preceded her. For example, the philosopher David Hume and economist Adam Smith count among a litany of venerated names from the Scottish Enlightenment associated with the City, while literary lions, such as Walter Scott, Robert Louis Stevenson, and Arthur Conan Doyle, abound. Men and their scandals are also remembered there. In the months that Maria Short campaigned for the return of the Great Telescope, the Burke and Hare murderers sold the bodies of their victims to the prominent anatomist Dr. Robert Knox for public dissection. Three men—William Burke, William Hare and Knox—remain infamous but not so their acquitted

accomplices, Margaret Hare or Helen MacDougal. Of the convicted man Burke, Cockburn wrote, "a sensible, and what might be called a respectable, man; not at all ferocious in his general manner, sober, correct in all his other habits, and kind to his relations," (Memorials, 430). Yet how did the man, whose memorials span thousands of pages and chronicle decades of life in the City, characterize the accused murderess that he defended at trial? Cockburn wrote, "Though not regularly married, Helen Macdougal was his [Burke's] wife" (Ibid).

Scores of public monuments attest to one of the ways that Edinburgh memorializes historic figures from the eighteenth and nineteenth centuries. Dozens of bronze men watch over its streets, but the only woman with a name that it honours in that fashion is Queen Victoria.[161] Since that practically places the British monarch—an Englishwoman with a German mother—in the same category as a Skye terrier named Greyfriars Bobby, one might conclude that no Scottish woman of any consequence ever existed. However, there is no shortage of significant female figures from Scottish history or research concerning them. In "A Land Fit for Heroines" an article concerning the preparation of the 2006 *Biographical Dictionary of Scottish Women*, Elizabeth Ewan restated "one of its aims [as] 'releasing the hidden past of women in Scotland' (1). Ewan moreover explained, "one of the unexpected delights of this project has been the discovery of just how much research is underway" and states that their original estimate of 300 entries "increased rapidly" to 820 and totalled more than 1000 women with the inclusion of co-subjects, by 280 contributors (3). More than a decade after that publication, members of *Women's History Scotland* continue their efforts to enhance public awareness of their subjects. In a 2016 newspaper article concerning the absence of public memorials that honour Scottish women and campaigns to remedy the situation, WHS convenor Alison McCall explains that whereas, women were sometimes "deliberately written out of the history books,"

> A lot of the women we would want to honour are women who saw a problem and set about solving it. They didn't donate their diaries to an archive because they weren't thinking of their own personal glorification. (Garavelli n.p.)

My research indicates that Scottish women were busy doing laundry and a whole lot else besides. As obscured, marginal and marginalized figures, Maria Short and her projects, occupy

and complicate the shifting borders of public space and vision in the nineteenth century alongside innumerable hidden heroines and working-class women. Operating in a city dominated by men that have long enjoyed worldwide recognition, the history of a willful woman as the proprietrix of exhibitions of optical instruments offers an alternative perspective that shows the value of gender as an analytical category of difference that continues to matter. Uncovering the history of Maria Short is vital, because early examples of female and subaltern technologists can counter residual tendencies that identify new media with expert white men and isolate, as anomalies, inexpert and othered users. Shedding light on some of the strategies of, and challenges to, knowledge and power in a place of scientific progress and reform, during an age of imperial and colonial domination, has entailed analyzing the splendid camera obscura as effecting, and effected by, multiple meanings and differential bodies. It has meant exploring the obstacles, affordances, and negotiations attendant to Short as a woman with a historically-specific status, applied and defied according to societal expectations and dictates regarding who could see and be seen, when, where, how, and why. By attending to diverse actors and specific dispositions at a local and material level, this study moreover contributes to understandings of the projected moving image as media before cinema with a revised focus and new set of lenses.

A great telescope served as the starting point for Short's projects and the shift from that instrument to a splendid camera obscura marks an inversion that suggests the emergence of exhibition media in place of earlier, more elite, and more private forms of scientific culture. As opticians and observatory builders, the family of Maria Short initiated the struggle to establish astronomy in Edinburgh—a process that began with popular appeals to scientific and personal improvement, and developed into the instituting of a discipline that naturalized the limitation of participation by amateurs and nonprofessional contributors, such as assistants and researchers who were otherwise barred from formal education. The history of the Shorts therefore provides an alternative perspective to the tensions between processes often characterized as the popularization and professionalization of science, and the family's early implication in the social construction of Calton Hill as a symbolic and masculinized place to look at, and from, provides further context.

Popular observatories, which also displayed other optical projection technologies (including magic lanterns and solar microscopes), provided the first sites of the splendid camera obscura. Curious connections can be traced between the splendid camera obscura, the panorama and other types of aerial perspectives that evoke visual experiences that are at once dominant and perplexing, strategic and sublime. This history asks whether marginalized users could deploy such views in different ways, thereby intervening and shifting prevailing discourses. Being chronologically situated between the cabinets of private collectors and the public museums of science that emerged in Britain in the mid-nineteenth century, could it be that the founding of Short's Observatory played a role in that shift?

Like other displays of scientific wonders made in spaces dominated by men—such as universities and scientific societies—the uncertainty regarding its epistemic status highlights the difficulty of distinguishing education from entertainment, which is even more difficult before and during the development of scientific disciplines as specialized, professional and exclusionary. The activities of Maria Short augmented and drew on this tension. Whereas earlier and contemporary women contributed to the dissemination of scientific knowledge as writers and researchers—practices that took place presumably unseen within private and domestic spaces—Short is notable as a willful and non-expert operator who visibly claimed access to public space and vision through her acquisitions of optical instruments, and in turn, opened that access to others. That her motivations and tactics emerged out of a spectacular family history of gender discrimination and resistance, which saw her ejected in infancy from her father's would-be public observatory alongside her mother and sisters, makes operations of marginalization and the marginalized even more significant to her story. Because she refused to comply with municipal regulations or middle-class decorum, her opponents would have pictured Short's work as a proprietrix as a proprietorship without propriety.

Limited access to education, property, and public life, may have historically hindered the participation of numerous subjects in numerous fields, but ideologies about class and individualism may have also discounted and obscured less dominant actors including family members, employees and servants. Attending to women, as among those historiographically

hidden and overlooked, requires examining sites where their visibility was prominent or at least relatively unhidden—for example, their representations as spectacles and spectators. Critiques that explore the positioning of women and subjugated others as objects of a patriarchal gaze demonstrate the implication of optical media in hierarchies of power and the discursive constructions of norms and identities that Short as a willful subject frequently flouted. Such approaches are no less important to this study. Nineteenth-century texts and illustrations of splendid camera obscuras picture women as subjects that were observed and observant, and their relationships as middle-class and heteronormative. As this study explores, such material traces relations between technology and gendered discourses of the body that have resonated between cameras and women ever since. Imagining voyeurism at splendid camera obscuras disciplined behaviour by rendering presumably private moments visible, and reinforced an internalized gaze.

Cultural representations of splendid camera obscuras may however contain little more than tenuous connections to exhibitions that actually took place. How Short and others presented their displays may have been far more varied. Therefore, beyond a discursive history that explores only abstract representations of devices and practices, this study takes seriously actual installations, alongside the experiences and potential agencies of their operators and visitors to explore how technology could be redefined through localized applications previously unimagined by inventors, promoters, and theorists. Short's use and promotion of optical media to the non-elite and the non-expert at a place then designated as a culturally elite site is one example of an unexpected application and her installation provided additional opportunities for transgressive acts. Consider the nature of splendid camera obscura presentations as generally guided affairs. Adding entertaining and educative value, camera operators controlled and explained the devices. Each performance therefore supplied them with chances to narrate, manipulate, and disrupt the view. For example, they might position the camera's eye to reveal activities by women and men, which other discourses might conceal or represent in different ways. And while camera obscuras may have helped naturalize surveillance and scientific imaging as nonthreatening and veridical, it is possible to consider how their deployments at Short's Observatories could have exceeded their commercial application.

Opportunities for politically-charged, resistant and potentially oppositional applications exist given an anti-determinist assumption that technologies have no absolute predetermined or inescapable meanings. While operator and visitors of splendid camera obscuras may have made no "claim to political subjectivity and collectivity," they could assume their right to look (*Mirzoeff Right to Look 1*). Nicholas Mirzoeff asserts that "the right to look claims autonomy," and by participating in mutual recognition as a reciprocal exchange, that claim can "arrange the relations of the visible and the sayable", and as such, is a claim "for a right to the real" (*Right to Look* 1).[162] An analog to that process of claiming can be found in a description of Scotch washing. That is, *not* an erotic representation made for a patriarchal gaze, but rather the actual practice of working women supporting other working women to complete difficult but necessary labour. The historic method of Highland laundering comprises singing songs to maintain rhythm and facilitate the corporeal endurance required to stamp out dirt. To maintain balance while treading in icy water, hands rest on shoulders, with women face to face—a position that enables what Mirzoeff recounts as a "look into someone else's eyes to express friendship, solidarity or love" (Ibid). While working women of Calton Hill could have used collaborative approaches to practice forms of countervisuality, apparent rivalries between Maria Short and other proprietrixes of Calton Hill—Mrs. Ker and Mrs. Forrest—suggest otherwise. While the washer women may have worked together, it is more likely that competition between exhibitions, fueled by an incessant, individualistic and profit-oriented drive, perpetuated the dominant hierarchies that structured their marginalization and positioning against one another in the first place. Short, who was considered an especially aggressive promoter, may have thought that the treasure then available to women (revenue, respect, freedom, etc.,) was simply too meager to share.

Recall nevertheless that my search for proximate and related displays uncovered evidence of several splendid camera obscura installations in nineteenth-century Edinburgh and almost all had a willful woman at the controls. That multiplied opportunities for differential and potentially resistant deployments. Alongside Maria Short, there was Agnes MacArthur, Dolly Holroyd, Mrs. Ker, and a young lady with precious limbs controlling devices that overlooked the City. Rather than positioning Maria Short as an *exceptional abnormal*, let's draw from the

approach by microhistorians, and consider her an *exceptional normal*—a particularly well-documented example that represents the potential for similar past, future and ongoing media practices that are frequently obscured. My study therefore presents her history to posit the activity of women as operators of scientific and exhibition media technology in three possible senses: 1) as machine operators working in direct control of technical devices; 2) as business operators managing access and promotion; and 3) as smooth operators who must confront disadvantages posed by gender, status and other obstacles. By focusing on a woman, the corporeal discourses and interactions associated with her signature devices, this history considers the experiences and interventions of people and phenomena that might easily be overlooked as unnamed or subordinated, and unimaginable. Given the unique opportunity to research the remarkable Miss Short, this study of splendid camera obscuras began with a simple premise. Because women comprise at least fifty percent of the actors implicated in the making of media, its meanings and legacies, the inclusion and recognition of their historical roles is essential to balance, expand and enrich understandings of where we stand now and where we might go.

The Vexatious Subject returns

> *Willfulness involves persistence in the face of having been brought down, where simply to "keep going" or to "keep coming up" is to be stubborn and obstinate. Mere persistence can be an act of disobedience (Ahmed* Willful Subjects *2)*

Maria Theresa Short—if that is indeed who our persistent proprietrix was—would have been about 62 years old when she and her popular observatory were forcibly removed from Calton Hill. That might have been a signal to retire, and with mentions of the once vexatious subject fading from the news reports and minute books that chronicle Edinburgh, the older Mrs. Robert Henderson might have indeed been more retiring than old Miss Maria Short. However, the sexagenarian's decision to rebuild may offer the best evidence yet that, even if not by dint of biology, she was, like her father, a willful child. Roughly the same age as Thomas Short when he first initiated his observatory project, Maria would spend her senior years purchasing and retrofitting the property on Castlehill to house yet another exhibition of scientific instruments and a splendid camera obscura. Unlike the Short that allegedly fathered her, the woman ousted

from Calton Hill, would see her final project completed with the building of a tower from high ground up. For less than five years after the destruction of Maria's first venue, Short's Observatory "stretched upwards" like the arm from the grave of the willful child (Ahmed *Willful Subjects* 1). On May 22, 1855, the *Caledonian Mercury* announced its opening:

> SHORT'S OBSERVATORY.—Among the permanent objects of interest that are now and again being added to the already not inconsiderable list of the "Lions" of our city is the new Observatory, or rather the reconstruction of the late Mr. Short's Observatory [sic] at the head of Ramsay Lane on the Castle Hill, and which has been in a state of desuetude since its removal from the Calton Hill four years ago. To the lovers of sightseeing and the marvellous, it will afford a vast variety of amusing and instructive subjects, whether of earth, air, or water. Besides the powerful telescopes already in use, one of colossal proportions is in course of construction, the focal dimensions of which are five feet long by six inches of an aperture. In addition to these is a solar microscope, the amazing properties of which are displayed in illustrating the infinite extent of organic life. By it the eye of a fly is magnified to an expense[sic] of twelve feet. Dividing attention with these are a Galvanic Electrifying Machine, and a working model of the Electric Telegraph, the principles of which are explained by one of the guides in attendance. The visitor is next led to the exterior of the building, from the summit of which, 100 feet above the Castle Hill, he may enjoy a panoramic view of the city and surrounding country. The interior of the large tower that surmounts the whole is fitted up with a Camera Obscura. The Observatory will well repay a visit from the townsman as well as the stranger.

The preceding review suggests that its late twentieth-century transformation into the major tourist attraction, presently known as *Edinburgh's Camera Obscura and World of Illusions,* is a restoration of the site to its original purpose. While its splendid camera obscura is now arguably the best known and most visited in the world, the rooms beneath it showcase an abundance of old and new scientific media technologies much like they did at Short's Observatory. Like their nineteenth-century counterparts, today's visitors can spy through telescopes mounted on the rooftop terrace, examine microscopic imagery in projected magnifications, play with the optical toys that anticipate cinema, and marvel at lens and mirror-based devices of the kind described by David Brewster in his *Letters on Natural Magic* (1832). While plasma balls stand in for the "Galvanic Electrifying Machine" and interactive displays that feature sensor-based and digital devices supply the novel substitutions for the once new "Electric Telegraph", embodied experience and baroque visions are highlighted by labyrinths and infinity mirrors that confound the senses, a bewildering Ames room that apparently shrinks and enlarges its inhabitants, and a dizzying Vortex Tunnel that has handrails to prevent tumbles caused by disorientation. Like its

nineteenth-century forebear, *Edinburgh's Camera Obscura and World of Illusions* additionally draws mixed reactions by making accessible technologies that are normally unavailable to the general public. For example, *The Scotsman* reported in 2011 that, once assured that it posed no risk, the *Heat Cam*, which uses the kind of thermographic camera more commonly seen used by airport security, delighted a pair of French tourists with the onscreen sight of their unborn child. Manager Andrew Johnson explained,

> It's a very different way of seeing your baby from a scan in a hospital. You're not lying on your back and seeing it on the screen. It's in colour, you can move around and it's also a shared experience you can show other people ("Mon Dieu! That's my new baby on screen" *The Scotsman* 27 July 2011).

Eye Spy Edinburgh another display featuring modern surveillance technology has on occasion drawn less enthusiastic reviews. Referring to its bank of monitors, which display live video fed from tower-mounted military grade cameras that visitors manipulate with joystick controls, Kirsten Johnson reported in a 2015 edition of *The Mail on Sunday* that "Politicians, civil rights campaigners, and local residents criticised using the private lives of individuals as entertainment," and quoted Big Brother Watch director Emma Carr, who stated "CCTV cameras are not toys and shouldn't be trivialized by becoming a tourist attraction" (30). Whether the Eye Spy cameras facilitate greater invasions of privacy than commercially-available drone cameras, or for that matter the digital capture and distribution capabilities of mobile phone technology, is uncertain, yet their placement mere feet away from the periscope of the Castle hill tower makes explicit links between current surveillance technologies designed for both administrative and recreational uses, and the splendid camera obscuras of the nineteenth century. Then, as now, non-authoritative appropriations of apparatuses that are associated with governance demonstrate tensions between resistant and hegemonic practices.

While few conclusions regarding the political motivations of Maria Short and their effectiveness are possible, the story of how the splendid camera obscura came to overlook Edinburgh from the Castlehill end of the Royal Mile can be further recounted. Whereas multiple archives hold letters of intent, pamphlets and subscription lists, as well as minute books, newspaper reports and advertisements that document the beginning and operation of Short's Observatory, how

the Hendersons rebuilt and financed the business is however less a matter of public record. With traces of Maria's second venture being relatively scant, since destroyed, or presently missing, it is also possible that the Castlehill observatory generated fewer and less meaningful documents because it was more simply achieved. That 4000 residents had signed a petition in favour of the Calton Hill site indicate the presence of widespread support for Short's Observatory, but Maria and her husband Robert Henderson may have opted for a quiet recovery, enabled by relatively inconspicuous means, such as personal savings, private donations, and loans from relatives and close acquaintances. Contrary to the tactics required by Miss Short to found and manage her original venture, the couple for the most part skirted controversy and opposition by neither publicly soliciting sponsorship nor using public land. Nevertheless, it is possible to finish Short's story with the help of government records, press notices and legal documents that detail the purchase, financing and management of the Castlehill property.

On the morning of May 20, 1853 "betwixt the hours of ten and eleven o'clock," Robert Henderson presented for entry into public record an original deed dated the 2nd, 10th and 18th of April 1852 for a Castlehill property from the trustees of its previous owner, a William Murray who had since deceased.[163] While the resulting entry in the Burgh Registry of Sasines for Edinburgh (its public registry of deeds) specifies that Henderson acted not only for himself but also on "behalf of Mrs. Maria Theresa Short or Henderson," who retained full rights to administer the property alone "without the consent or concurrence of her husband," it records neither property value nor civic address. Instead the record identifies five dwellings, their previous owners and summarily describes the purchase as "the whole of that large tenement of land which is now the west most land on the northside of the Castlehill lying on both sides of and including the close called Skinners Close." Historian James Grant later described in *Cassell's Old and New Edinburgh*, "the group of buildings partly demolished to make way for Short's Observatory" as "most quaint":

> One was dated 1621; another was very lofty, with two crowstepped gables and four elaborate string mouldings on a smooth ashlar front. The first of these, which stool at the corner of Ramsay Lane, and had some very ornate windows, was universally alleged to be the town residence of that personage so famous in Scottish song, the Laird of Cockpen [lyrics by poet

> Carolina Oliphant, 1766-1845], whose family name was Ramsay (being a branch of the noble family of Dalhousie) and from whom some affirm the lane to have been called, long before the days of the poet [Allan Ramsay, 1686-1758] (91).

Renovations of the new property would once again divide Town Council into factions, but only for a relatively brief time. In May 1854, the Dean of Guild's Plans and Works Committee investigated claims of "certain alleged encroachments upon the line of view of the High Street" and enlargements to Short's new building that exceeded the approved plans (23 May 1854, ECA TC Minutes [262]). The committee reported on the matter in August and, by a slim majority of 4 to 3, made recommendations against memorials that petitioned Town Council "to revoke the decision condemning the said erection and grant permission to the Proprietor to proceed according to the present plan." However, the Council voted 8 to 7 (with two abstaining) against the Committee and the Lord Provost, in favour of the Hendersons, with Councillor Ritchie once again being among their protectors (8 August 1854, ECA TC Minutes [263] 187-88). A final bit of business concerning the founder of Short's Observatory and Town Council concluded the year before the deaths of Maria Short and Robert Henderson. They requested that Town Council help pay for storm-caused damage to their Castlehill building. The response? A definitive no.

> The Magistrates and Council having considered a Petition to the Dean of Guild Court by the Proprietors of Short's Observatories for warrant to execute certain repairs thereon, which Petition had been served on the Chamberlain for the City's interest,—resolved not to interfere therein (22 September 1868, ECA TC Minutes [298] 330).

Town Council would no longer bother with the owners of Short's Observatory, but legal wrangles with relatives over outstanding debt followed Mrs. Henderson, much as they did during her childhood. Just as Thomas Short borrowed from nephew and grandson in the preceding century, his daughter accepted loans from family members that, like her mother Jacobina Downie, she was unable, or unwilling, to pay. Additional entries in the Register of Sasines record a convoluted series of bonds and dispositions against her Castlehill property that begin in November 1853 and identify her primary creditors as her sister-in-law Ann Faulds and Faulds's husband, the Rev. David Henderson, the brother of Short's husband (who according to the register of Short and Henderson's marriage, had conducted their wedding). Whether this led to severed relations or awkward family gatherings is unrecorded and largely irrelevant, but

another bundle of papers amidst the Court of Sessions documents recounts a lengthy suit between sisters-in-law ("Henderson v Henderson" NAS CS275/21/22). The conflict helps explain the advertisements to let Short's Observatory that appeared in *The Scotsman* on September 16, 1860 and February 27, 1861. While helpful in its description, the notice seems to betray the attachment Mrs. Henderson so clearly had to her venture. The February 27 *Scotsman* notice read,

> TO-LET with Entry Immediately,
> THOSE PREMISES situated in the CASTLE-HILL, Edinburgh, formerly known as SHORT'S OBSERVATORY, consisting of Galleries used for-scientific purposes, a large Platform above the same and a Glass House used as a Photographic Saloon, and two Towers fitted up for a Camera Obscura. To any Gentleman, of means capable of furnishing the Rooms and Towers in a proper style, a handsome return may be expected. From the Platform, one of the finest views of the city and Firth of Forth is to be obtained; and a very large business may be done in the Photographic Department.
> Apply to WILLIAM WHITE MILLAR; S.S.C., 8 Bank Street, Edinburgh; or Mr WILSON, 1 Pilrig Place, Edinburgh. 26th February 1861.

As it turns out, William Millar had a stake in Short's Observatory, which he obtained when he lent £300 to Ann Faulds, after she pledged her own interest in the property. Faulds must have defaulted on her repayment to Millar, which would have not likely happened if Maria had repaid her.

In 1858, the observatory owner had accrued a £900 debt to her sister-in-law. Millar attempted to retrieve the amount owed to him by evicting Maria from her own building and leasing the vacated space. Despite placing at least two newspaper advertisements to let Castlehill, the eviction of Short and Henderson never transpired and a transfer of debt to solicitor John Murray in 1863 resolved the legal trouble between Short and Faulds. Murray divided the debt among a new set of unconnected trustees by selling them their shares as investments. Short and Henderson paid interest, but never reduced the principal on the original loan. After they both passed away in 1869, the trustees who were then its de facto owners rented Short's Observatory along with the instruments inside to "philosophical instrument-maker" Mr. Hart, who moved his business there from College Street (*The Scotsman* 3 January 1870). After Hart grew too old to manage the site, and a new generation of trustees inherited the debt, the

building and its camera obscura were sold at auction to Patrick Geddes, who turned Short's Observatory into Outlook Tower.[164]

Neither the demolition of the Calton Hill site in 1850, nor the deaths in the Castlehill tower in 1869, nor even Geddes's renaming and repurposing of the building in the early 1890s ended the willfulness of Miss Maria Short. Not only did Maria open her second popular observatory in 1855, the business persisted for over two decades after her passing, and a splendid camera obscura continued as the site's chief attraction throughout its term as Outlook Tower and into the present day. But could a kind of ageless immortality apply to both Maria and her projects? Afterall, official records indicate that it was old Mrs. Henderson who succumbed to debility in the Castlehill tower, and not the troublesome spinster known as Miss Maria Short. Unable to locate an obituary or published memorial for their building's founder, those now running the Castlehill site, had no idea when, where, or even if, she had passed on. In fact, at the beginning of my research, the management of *Edinburgh's Camera Obscura and World of Illusions* shared with me the 2004 title deed search of their Castlehill site. It indicates that the property was held in trust under the ownership of Short and Henderson until being placed for sale in October 1891, and concludes that "they were still living in the property at the time" (David Hayes to Andrew Johnson, 2 August 2004). A surviving child of Thomas Short would then be at least 103 years old. If one could picture the proprietrix of Short's Observatory as a feisty centenarian climbing the six-storey tower to survey Edinburgh in her splendid camera obscura, then why not think that Miss Maria Short still in some sense operates there? Now imagine yourself in a dark room. The ancient and vexatious subject brandishes onscreen live and moving projections of the city below. Spinning her splendid camera obscura into disorder, she tells stories of old Edinburgh, mocks its elite, points out its lovers and laundry, and willfully makes a spectacle.

ENDNOTES

[1] A scan of Short's record of death is on file in the online database ScotlandsPeople. "Maria Theresa Henderson, married to Robert Henderson, proprietor of Short's Observatory" passed away on January 15, 1869 at Short's Observatory, Castlehill, Edinburgh. Her cause of death is listed as "debility" and her age at the time of death is listed as "about 70 years." If she was, as the certificate of death also claims, the daughter of "Thomas Short, astronomer" and "Jacobina Short (Downie)," she would have been born in 1788 and so about 80 when she died.

[2] In a retrospective essay that begins by acknowledging the heterogeneity of feminist science studies, Subramaniam explores trends, impacts, and developments in the field from the 1980s to 2000s. She criticizes its tendencies to suppress other categories of differences (such as race, class, sexuality, etc), posit problematic sex-gender binaries, and rarely venture outside disciplinary boundaries of social science and humanities,

[3] Collections edited by Bernard Lightman, for example, comprise thousands of pages of studies researching activities related to the popularization of science in the nineteenth century, by various historians as well as his own articles and monographs. Lightman's texts include *Victorian Science in Context* (1997), *Figuring it Out* (2006) co-edited with Anne B. Shteir, *Science in the Marketplace* (2007) co-edited with Aileen Fyfe, *Victorian Popularizers of Science* (2007) and he is also the series editor of the University of Pittsburgh Press series *Science and Culture in the Nineteenth Century*. The works of scholars, such as Richard Holmes, Jack Morrell, Iwan Rhys Morus, Alison Morrison-Low, James Secord and Steven Shapin, that investigate nineteenth-century instrument makers, scientific practitioners, and commentators, as well as popularizers, are referenced throughout this text.

[4] On definitions and discussions of Media Archaeology, see Jussi Parrika, *What is Media Archaeology*?; Parikka and Huhtamo, "Introduction" and Sobchak, "Afterward" in *Media Archaeology: Approaches, Applications and Implications*. As frequent collectors of old and obscure media, self-proclaimed media archaeologists also seem to collect scholarship and artistic practices with similar concerns. For example, Huhtamo and Parikka call Walter Benjamin, Marshall McLuhan, and Aby Warburg (among others) "in some ways media archaeologists *avant la lettre*" (2) and identify with numerous artists including, Paul DeMarinis, Toshio Iwai and Zoe Beloff (14-15). Since they also include scholarship by researchers such as Siegfried Zielinski and Friedrich Kittler who resist the classification (10-11), they might also categorize this study as media-archaeological, which I would accept even though I would demur from claiming that association myself.

[5] Summarizing the heterogeneous approaches of the early microhistorians of the 1970s, which can be loosely be divided into socio-economic (quantitative) and cultural (interpretative) wings, Francesca Trivellato observes that "they aimed at nothing less than revising accepted narratives about the emergence of modernity and tackling large methodological questions such as the relationship between case-study and generalizations, between material conditions and symbolic representations, and between empirical reconstruction and narration" (125). With the specificities of lived experiences, especially those subjects considered marginal or singular, potentially lost in new abstractions, Trivellato argues for the significance of microhistory in relation to the rise of global history, big data and new grand narratives, while noting that alongside the emergent unity of Italian microhistorians, international versions and borrowings are transforming the approach. She explains that Americans use narrative writing "prized not only for its accessibility to a larger audience but also for its suitability to recover the subjectivity, and even the interiority, of individual protagonists" and focus on agency as "an emphasis on the individual's ability to resist and shape the larger forces of history" (127). While Carlo Ginzburg calls for "a self-reflexive and sophisticated empiricism", Natalie Zemon Davis confronts "the problem of invention" by making ample use of the "conditional"

and "speculative" tenses and by applying historical context to fill in the inevitable gaps of the historical record (128).

[6] Ginzburg's *The Cheese and the Worms* uncovers how inquisitors found "Menocchio" (Domenico Scandella), sentenced to execution in the sixteenth century, guilty of heresy because he could not keep silent about his eccentric cosmology, whereas Davis discusses how in *The Return of Martin Guerre* "Pansette" (Arnaud de Tihl) was revealed as an impostor who had taken over another man's life.

[7] Applying a research approach he calls "archeo-optics", Matt Gatton speculates that camera obscura effects would have been observed and applied in paleolithic tents made of hides. The evidence, he argues are in the multiplication of features found in Paleolithic drawings of animals, which he argues would have resulted from tracing projections of live images in tent camera obscuras and then transcribing them into cave art—a hypothesis that he tested with students drawing animals from memory and by tracing video projections. Along with Gatton's article listed in the bibliography, see also his website at paleo-camera.com.

[8] Kaja Silverman also discusses the camera obscura in her earlier article "What is a Camera? Or: History in the Field of Vision," published in *Discourses* in 1993. There she critiques cinematic apparatus theory and discusses how identification of the cinematic spectator with film is reinforced through "suture." (Suture theory is based on the cinematic cut). Silverman argues that the desiring "look" of a cinema viewer is distinct from the "camera/gaze".

[9] Despite its name, a camera lucida incorporates no box or room at all. It is a personal drawing tool that uses a prism, which projects for its user the appearance of a traceable real-time image of the scene. For further explanation of the camera lucida, see *Secret Knowledge*, wherein Hockney discusses his drawing experiments using the instrument.

[10] Schwarz's article "An Eighteenth-Century English Poem" includes a reprint of a poem about a camera obscura published in 1747 by instrument-maker John Cuff, and an observation that Horace Walpole criticized the 1772 portrait of John Cuff by John Zoffany (belonging to the England's Royal Trust Collection) for being too natural "the chiaroscuro destroyed by his servility in imitating the reflexions of the glasses" (in Schwarz, 131n8). On Schwarz's influence on art history and camera obscura scholarship, see "Introduction" in Schwarz, *Art and Photography*.

[11] Schwartz's 1966 article "Vermeer and the Camera Obscura," traced camera obscura history in connection to drawing and Dutch painters as a response to a 1964 article by Charles Seymour Jr., which also revived a nineteenth-century theory. That was followed in 1971, with a detailed analysis of painted optical aberrations in Vermeer paintings by Daniel A. Fink, who used an actual camera obscura to make comparisons.

[12] The debate regarding Old Masters and their applications of optical devices persists. In Spring 2017, a Canaletto retrospective at the Queens Gallery as Buckingham generated popular press articles regarding his use of a camera obscura, whereas the August 2017 book release of *Traces of Vermeer* by artist Jane Jelley generated more. For examples, see Hannah Furness, "Royal Collection uses Infrared Photography to prove Canaletto did not trace his drawings," *Independent* online, 14 April 2017; and Simon Jenkins, "Vermeer was a genius even if he did cheat", *The Guardian* online, 10 Aug 2017.

[13] On explanations of camera obscuras that use comparisons to submarine periscopes, see "How does it work," *Edinburgh's Camera Obscura and World of Illusions*, http://www.camera-obscura.co.uk/camera_obscura/camera_how.asp. Web. 2 January 2015 and "Periscope House (May 1947)", and Modern Mechanix blog, http://blog.modernmechanix.com/periscope-house/. Posted December 10, 2007.

[14] For examples of cameras obscura advertised in sales of household items, see *The Scotsman,* 17 May 1826, 19 April 1845, 4 Dec 1850; 8 Nov 1851 and 19 June 1863. For examples of promotions of publications that featured descriptions of the camera obscura, see *The Scotsman*, 14 Aug 1824, 12 May, 1847 and 5 Dec 1855.

[15] Other examples of camera obscura knowledge keeping by site managers include the friendly reception and resources offered to me at the *Dumfries Museum and Camera Obscu*ra, and the camera obscura newsletter that Mike Feist of the *Foredown Tower Camera Obscura and Astronomy Group* from Brighton and Hover, edited and circulated in the 2000–samples of which, I saw at Dumfries.

[16] Foundational sources of Scottish women's history include texts and edited collections by scholars such as Esther Breitenbach, Rosalind Carr, Elizabeth Ewan, Eleanor Gordon, Rosalind Kay Marshall, Gwyneth Nair, and Eileen Yeo. In order to gain a better understanding of the social and demographic history of Edinburgh, my reading also included texts and edited collections by R.A. Houston, R.J. Morris, Stena Nenadic and T.C. Smout.

[17] Scholars of British astronomy and instrument-making include Hermann Brück, Mary Brück, D.J. Bryden, Marian Donnelly, Thomas Hankins and Robert Silverman, Alison Morrison-Low, Iwan Rhys-Morus, Gerald L'E. Turner, etc. I also referenced several articles by Jack Morrell and Steven Shapin about the roles of universities and societies in the nineteenth-century histories of British science. And among the countless scholars of popular and romantic science, Richard Holmes, Jessica Rifkin, James Secord and Barbara Ann Stafford proved particularly useful sources.

[18] "Certainly if a gentleman called Short could revisit the tower…he would be quite unable to recognize the place, where he, towards the end of the last century, installed his Camera Obscura and stocked his rooms with…A powerful Galvanic Machine which gives Shocks of any Power, a Fairy Fountain of Electrified Water, and a wonderful Electric Boy.' (from *Scotland's Magazine*, August 1955, qtd in Veronica Wallace, 101.)

[19] Records of birth exist for the two younger Short brothers and can be retrieved from the ScotlandsPeople database. Both born in Edinburgh to William Short (burgess and wright) and Margaret Grierson, James was born 15 June 1710 and Thomas was born 25 December 1711. Additional information is recounted in various biographies concerning James Short. For examples, see David Brewster, "James Short" in *The Edinburgh Encyclopaedia* (volume 17, 262-263); D.J Bryden, "Note on a Further Portrait of James Short, F.R.S." and *James Short and His Telescopes;* Clarke et al, "James Short: The Optic," in *Brass & Glass* 1–10; David Steuart Erskine "Life of Mr James Short, Optician"; Gerard L'E. Turner, "A Portrait of James Short, F.R.S.", "James Short, F.R.S., and His Contribution to the Construction of Reflecting Telescopes" and "Eighteenth-Century Scientific Instruments and Their Makers".

[20] For information on the descendants of John Short, see "Some Notes on the Short Family of Stafford and King George Counties, Virginia," in *Genealogies of Virginia Families, Volume IV*.

[21] Accounts of James Short feature in numerous histories of Enlightenment science, astronomy and instrument making. Famous in his own time and remembered in Maria's, James personified the model "lad o pairts" that overcame humble beginnings through academic achievement in the relatively open system of Scottish education. In 1792, his first biographer, the 11th Earl of Buchan David Steuart Erskine noted the appearance of "his genius for mechanics" at age 10 when he was orphaned and placed in the Heriot Hospital, a charitable school for poor boys (251). While most other children from the school would become artisans and tradesman, James continued his education at the High School and afterwards at the University of Edinburgh. At first bound for an ecclesiastic career, he shifted his academic interests towards science and began polishing reflectors for telescopes in the rooms of his mentor, the Professor of Mathematics Colin Maclaurin, himself an orphaned prodigy. In 1736, James travelled to London as a royal tutor, soon after gaining official recognition for his talent as a telescope maker.

[22] Alongside his success as a telescope-maker, James Short was a vocal participant in scientific circles. He encouraged achromatic-telescope maker John Dollond and chronometer maker John Harrison, and acted as an official observer, writer, and telescope supplier in the global projects to chart the 1761 and 1769 transits of Venus. He might have ascended to the position of Astronomer Royal in 1765 had his patron, the Earl of Morton, then also president of the Royal Society not withdrawn his support. To Morton's displeasure, Short backed Harrison in the disagreement over the problem of longitude. On Short's potential appointment to Greenwich, see Turner, "James Short, F.R.S. and his Contribution", 92-93. For a popular history that recounts Harrison's struggle, see Dava Sobel.

[23] In the opening chapter of *Brass & Glass*, Clarke et al. attempt to trace the working relationship between James and Thomas Short, attributing Maclaurin's comment in a 1743 letter to Sir Andrew Mitchell to Thomas's incompetence (3-4).

[24] Maclaurin's use of the word "villain" and his complaint that "he has used me" may have been a judgement of Short's character as well as his competency. Maclaurin's praise of James Short's handiwork is quoted in Hermann Brück, 5. The complete letter cited by Clarke et al. appears in Mills, *The Collected Letters of Colin MacLaurin* 101.

[25] Both John and Alexander predeceased James, so Thomas was his only surviving sibling. For details of James's legacies to his relatives, and young James's death in Lisbon see Turner, "James Short, F.R.S. and his Contribution," 95, notes 31-35. On the £1000 left to Lady Douglas being reverted to Thomas Short, see also "James Short" in, David Brewster, ed. *Edinburgh Encyclopaedia* 264.

[26] In his biography of instrument maker Benjamin Martin, John Millburn notes that Thomas Short was among the instrument makers visited in London in the Winter of 1768-9 by Jean Bernoulli who published *Lettres Astronomiques* in 1771 (150). After overseeing the last of James's commissions—which included an order to help replenish the Harvard instrument collection after its 1764 fire—leftover stock was sold by auction and the shop closed in 1769 (Ibid). Millburn also notes that two instruments by James Short remained in Martin's inventory at the time of his death in 1862, reasoning that Martin purchased them at the sale of Short's estate (Ibid). On the 64 reflectors, see Bryden, *James Short and his Telescopes*, 32.

[27] The king of Denmark was likely Christian VII who was judged mentally incompetent shortly after his accession in 1766. On Thomas's return with the telescope, see Hermann Brück, 5.

[28] "Act of Council Granting to Thos Short half an acre of Ground of the Calton Hill, 22 May 1776", ECA D0105R.

[29] Observatory building in Edinburgh may aptly be called a "history of failure," with efforts thwarted by lack of funds, mismanagement, politics and general disinterest dating from 1736. Soon after an initial proposal to build an observatory in Edinburgh by Colin Maclaurin, local disruptions associated with the Porteous Riots, as well as the city's preference for building up facilities for the university's medical school, caused the first of many delays. The mathematics professor nevertheless raised considerable capital for the project, beginning with a donation from the Earl of Morton in 1741, and he prepared to begin construction in 1744. The following year however saw Scotland preoccupied with the 1745 Jacobite Rising, and Maclaurin, who helped organize Edinburgh's defence, fell ill and in 1746, passed away. His successor Matthew Stewart inherited the observatory fund, but apart from a wooden model commissioned to Alexander Short (most likely Maria's second uncle), no progress was made. Stewart spent much of the money on himself—a discovery made when James Short inquired into the state of the account during a 1766 visit (Bryden, "The Edinburgh Observatory" 457). Stewart made "a twofold and negative contribution to the observatory project" and what little remained, would go towards the observatory of Thomas Short a decade later (Ibid).

[30] ECA D0105R. "Act of Council altering the terms of the Tack to be granted to Thos Short, 10 July 1776."

[31] Thomas Short, optician appears as a witness on the registration of birth for James Douglas, born 11 April 1764, but I found no registration of birth for Thomas Douglas or for Margaret Douglas who would later file suits alongside her sibling James. There are registrations of birth in 1767 and 1769 for two other daughters of John and Reynald Douglas, named Cecilia and Ann, and it is possible that one of them was renamed Margaret, since a Margaret Douglas (wife of William Wood, shoemaker) is listed in later suits. I did not uncover any information on the first wife of Thomas Short or any other children from their marriage. Thomas Douglas likely passed away sometime before the 1790s, since his siblings make no reference to him in their suits.

[32] For a detailed account of the lawsuits involving unpaid builders, see Bryden, "The Edinburgh Observatory," 466; and *Caledonian Mercury,* 27 August 1787, 3.

[33] Elizabeth Beverly wrote an account of the Observatory struggles in a letter to Town Council that was transcribed into the "Act of Council fixing fees to be paid by the Students for access to Observatory, 4th December 1793," ECA D0105R, Appendix A.

[34] The Calton Hill observatory was named The Royal Observatory of George the Fourth following a royal visit in August 1822, which elevated its status to be on par with the Royal Observatory of Greenwich and helped initiate its transformation into a public institution in the 1840s. The name was shortened after the death of King George in 1838. The Calton Hill site became the City Observatory after the Royal Observatory moved to its current location on Blackford Hill in 1896. The Collective Art Gallery is renovating the observatory and plans to open it in 2018. Until its bankrupcy in 2015, Vivat Trust was maintaining the Gothic Tower (also known as the Old Observatory House) and letting it as a holiday rental. On the original agreement between the City of Edinburgh and the Astronomical Institution, see "Report of the Proceedings of the Directors of the Astronomical Institution, since Its Establishment on the 30th May 1812." *Scots Magazine* (July 1814): 501–504.

[35] The "Observatory" entry of Brewster's *Edinburgh Encyclopaedia* laments, "It is sincerely to be regretted by every friend to science, as well as to the scientific reputation of Edinburgh, that, from want of funds, proper instruments have not yet been provided, nor a salary for an observer, that might enable him to devote his attention entirely to the pursuits of astronomy" (volume 14, 571).

[36] When I began my research I attempted to find Veronica Wallace, but learned that she had passed away in 2008. According to a comment posted on her obituary (no longer accessible online), Wallace worked for the Edinburgh and Lothians Tourist Board. I found no indication that she did additional research. Its place of publication *Edinburgh Review* is not the same as the journal founded by Henry Brougham, although it might have been an attempt at a revival.

[37] I did not find any old maps that indicated the location of High Terrace, but it appears in a the description of Leith Street in the 1852-3 Ordnance Survey as follows: "A short street extending northward from the end of Princes Street to Catherine Street [which is between the General Register House of the National Archives of Scotland and the southwest foot of Calton Hill], on the western side is a range of shops above which is a terrace walk called High Terrace. The houses in this street are generally 5 storeys high, and well constructed. In it are many shops and various kinds of businesses." See Ordnance Survey Name Books, Midlothian OS Name Books, 1852-1852, OS1/11/100/7, a digital copy is available online at *ScotlandsPlaces,* https://scotlandsplaces.gov.uk/digital-volumes/ordnance-survey-name-books/midlothian-os-name-books-1852-1853/midlothian-volume-100/7, retrieved 30 Dec 2017.

[38] David Dobson published a wealth of information on Scottish immigration to the Americas including, a genealogical database of Scots in the West Indies 1707-1857 that is freely searchable at Ancestry.com. However Maria's absence from that list does not disprove that her story, it simply demonstrates that she did not appear in any of the newspapers, journals and various other sources that Douglas used to compile his information. Numerous Scots travelled to the Caribbean as sojourners (temporary migrants) intending to return to Scotland, see Marjory Harper 282-287. For additional research on Scottish emigration to the West Indies, and Scottish participation in the ownership and administration of plantations, see Douglas Hamilton. I also did considerable research on white women in the Caribbean, but did not consider it relevant to this thesis since I cannot confirm Short's travel and because I found no evidence that she had any involvement in the Abolition movement even though many women in Britain participated.

[39] According to Thomas Short's record of birth at ScotlandsPeople, he was born Christmas Day 1711, so would have been 76 at the time of his death.

[40] The couple had a daughter named John born in 1782, another named Jacobina in 1783, buried one-year-old James (a renamed Jacobina or her twin) in 1784, had another James one year later, and lost another Jacobina who died at one month in 1787. A James born in 1785 died in March 22, 1788. Dead at age three of "a consumption," he was buried near the grave of his father who had died just twelve days before. Therefore records for the children of Jacobina Downie and Thomas Short include only: John (b.1782), Jacobina I (b.1783), James I (d.1783), Jacobina II (d.1787), James II (1785-1788).

[41] Determining the average age at marriage before the mid-nineteenth-century introduction of statutory record keeping is difficult, so estimates are made based on fertility rates. The age of the father is assumed as "usually two or three years older," whereas more relevant factors include low rates of illegitimate fertility and the absences of accessible contraception. Between the mid-eighteenth century and the first decades of the nineteenth century, despite a population redistribution from rural to urban areas, fertility rates in Scotland are assumed relatively stable—suggesting that women were generally in their mid- to late twenties when first married. See R. A. Houston, "The Demographic Regime," 19.

[42] On the conditions of marriage in Scotland in the eighteenth and nineteenth centuries, see "What's Love Got to Do With It?" in Eleanor Gordon and Gwyneth Nair, *Public Lives* 71-106; and "The Marital Bond" in Rosalind Kay Marshall *Virgins and Viragos* 189-204.

[43] The National Archives of Scotland has a transcription of the will of James Short of Virginia alongside papers concerning a petition by his guardians (Monro and Spottiswood) concerning bonds and shares originally owned by James Short of London. NAS RD3/246.

[44] See "Petition of Dr Donald Monro and John Spottiswoode," 3 December 1784, NAS RD3/246.

[45] A record of original witness testimonies for the case against Downie et al, is kept in the "Record of Criminal Trials before the Lord Provost with an Assize, 1789-1828" 1-54, ECA SL233/1/4.

[46] See James Boswell, "Affairs in Scotland" in *Scots Magazine* 51 (January 1789), 47–48; *The Star*, 187 (6 Dec 1788); *General Evening Post.* 765 (30 Jan 1789); *London Chronicle* (5039) 19 Feb 1789; *The Public Advertiser (*7026 (19 Feb 1789); and *The Traveller's Companion through the City of Edinburgh.* (Edinburgh: Alexander Kincaid, 1794).

[47] See *ScotlandsPeople* database for the record of birth for John Short, b. 15 Feb 1782. Dugald Stewart (1758-1828), who witnessed John's birth, was the son and successor of Matthew Stewart, the mathematics professor that depleted the Observatory fund after the death of Colin Maclaurin. Cockburn describes Dugald Stewart as the "last of his illustrious class" and recounts the planning of his Calton Hill monument after a unanimous vote by his friends soon after his passing (*Memorials* 421-422).

[48] James Boswell of *Scots Magazine* reported on both Spalding and Lunardi in the 1780s. Charles Spalding was an amateur engineer who also ran a confectionary shop on the Edinburgh Royal Mile. He died during a descent in a diving bell of his own design in Dublin in 1783. Lunardi's second ascent from the grounds of Heriot's Hospital in 1785 ended with his falling out of the balloon and into the sea. A fishing boat saved Lunardi, but his balloon was later found "greatly tore[sic]" by the Royal Charlotte patrol cutter. See James Boswell*, The Scots Magazine, 45* (January 1783) 324–325*;* and *47* (December 1785) 653.

[49] Enclosed with Downie's letter is a small slip recording the baptism of John Short, dated February 26, 1782. See NLS "Unto the United Incorporations of Mary's Chapel, The Petition of Jacobina Short," 27 April 1789 in St. Mary's Chapel Vouchers, Acc. 8617 bundle 14.

[50] In a meeting held 6 February 1790, the United Incorporations considered a petition from Downie for financial assistance, and authorized the Treasurer to give her children no more than £1 to assist their education while investigating her circumstances, see ECA Incorporations Minute Book from 1784-1796 (Acc. 622/3) 191. Thank you to Dr. Aaron Allen, who researches the association, for locating the reference to Jacobina Downie in the Minutes.

[51] "Testament Dative and Inventory of Goods which pertained and belong to Thomas Short," 1793. NAS CC8/10/15B.

[52] Multipoinding is a term in Scots law for a legal action that determines conflicting claims to the same fund or property. The 1791 case was initiated on behalf of the trustees for the John Short Jr trust, Mr. Keith and Mr. Moir. Printed and annotated testimonies for James Douglas and Jacobina Downie are located in the library at the Faculty of Advocates in Edinburgh, as Items 11 and 12 in Session Papers 1792, vol 64, from the J.F. Campbell Collection.

[53] See "Information for James and Margaret Douglas, Grandchildren of the deceased Thomas Short, Optician in Edinburgh; against Jacobina Downie, and John McFadzen, Apothecary in Edinburgh, for his Interest" December 13, 1791, Item 11, in Session Papers 1792, vol 64, 12.

[54] See "Information for Jacobina Downie, Relict of Thomas Short, Optician in Edinburgh against James Douglas, Optician in Edinburgh, and Margaret Douglas, his Sister," November 8, 1791, Item 12, in Session Papers 1792, vol 64, 7.

[55] See handwritten margin notes on the cover page of "Information for James and Margaret Douglas, Grandchildren of the deceased Thomas Short, Optician in Edinburgh; against Jacobina Downie, and John McFadzen, Apothecary in Edinburgh, for his Interest" December 13, 1791, Item 11, in Session Papers 1792, vol 64.

[56] The University of Edinburgh Centre for Research Collections (CRC) online database for Students of Medicine, 1762-1826 indicates that McFadzen was registered in 1786 and 1787 (http://www.archives.lib.ed.ac.uk/alumni/).

[57] The outcome of the multipoinding initiated in 1791 is described in documents found in the bundle concerning the "Petition of Joanna, Margaret, and Maria Shorts," however the date that the decision was made is unspecified, see NAS CS231/D6/2, item 10.

[58] While there is some ambiguity about the prevalence and causes for irregular marriages, with some estimates as great as one third of all unions in eighteenth-century Scotland, non-conformity is one rationale and property settlement, as in Downie's case, is another. Countless legal disputes over what constituted consent and how it could be established would lead to revisions of Scottish marriage laws in 1868 and 1935. Therefore, the Downie case may not have been that unusual. On irregular marriages in Scotland, see Eleanor Gordon, "Irregular Marriages: Myth and Reality."

[59] See "Act of Council authorizing an agreement to be made with James Douglas relative to the Observatory," 30 March 1791." ECA D0105R.

[60] See "Act of Council refusing to give any further sum for finishing the Observatory, 10th April 1793." ECA D0105R.

[61] Elizabeth Beverly died February 10, 1795 of an "inflammation of the lungs" at Mills Close, Canongate (a district of Edinburgh). Captain James Douglas married Janet Torry on May 29, 1795. See *ScotlandsPeople* database for records.

[62] See "Letter from John McFadzen to William Callender, from Fort George, Guernsey," 4 May 1796, in "Moir v Callender," NAS CS236/M/9/10. Fort Guernsey was a British army base, strategically situated to protect against invasion from France.

[63] See NAS "Petition of Joanna, Margaret and Maria Shorts, Children of the marriage betwixt the deceased Thomas Short optician in Edinburgh and the also deceased Jacobina Downie his spouse, and John McBayne writer of the Signet their Tutor ad litem." 29 January 1799, Douglas v Shorts, NAS CS 231/D6/2/10.

[64] Captain James Downie is listed as the second witness, besides Lieutenant James Douglas on the 1783 registration of birth for Jacobina Short (deceased or renamed Margaret). An acquaintance between the Douglas and Downie based on military, service as well as familial connection, might further account for Margaret Douglas knowledge of Captain Downie's estate. For details of the Jacobina Downie's share of James Downie's estate (based on a Falkirk property but saddled with heritable debts), see summary in the "Petition of Joanna, Margaret and Maria Short," 19, February 1799, 32-33 in Douglases v Shorts, NAS CS 231/D6/2/10.

[65] On Joanna Short's visit to Callendar, see "Answer for William Callender," 9 July 1796 in Moir v Callender, NAS CS236/M/9/10.

[66] See "Answer for Margaret Douglas, 14 and 16 February 1799," in Douglases v Shorts, NAS CS 231/D6/2/11).

[67] See "Letter to Callender from M. Young, Inverkeithing, 18 August 1796, in "Moir v Callender, NAS CS236/M/9/10. A tutor or curator *ad litem* represents minors in lawsuits but has no authority over care or property like a legal guardian.

[68] "The Petition and Complaint of John Moir Writer to the Signet and Willian Allister his clerk, 24 June 1796" in Moir v Callender NAS CS 236/M/9/10, 13-14.

[69] See "Petition of Joanna, Margaret and Maria Shorts," 22-23, in Douglases v Shorts, NAS CS 231/D6/2/11.

[70] The history of the Geheimes Hausarchivs (the central archive of the House of Habsburg) is summarized on an information page for the Austrian State Archives, http://www.oesta.gv.at/site/6136/default.aspx.

[71] Edinburgh city archivist Peter Clapham explained to me in an email dated 23 August 2016 that there is little known about the assembly of the MacLeod Collection, only that it is at least a century old. He sent me a copy of its electronic records, which indicates that the collection contains documents that date from the mid fifteenth century to 1896. The contents of ECA D0105R are not completely itemized. Copies of the Acts of Council and Maria Short's letters are listed together as a single entry identified as item 2. The seven other entries for D0105R refer to original documents dating from 1776 to 1811 that concern the observatory of Thomas Short.

[72] The history of Thomas Short's failed observatory project that appeared in the *Caledonian Mercury* in 1788 was reprinted in *Scots Magazine* a year after. It is also recounted in Arnot 319-320, and repeated in guides to Edinburgh such as Willox (181-182) and Grant (Volume II). However, as previously mentioned David Gavine and D.J. Bryden researched the history of astronomy in Edinburgh, and referencing the extracted Acts of Town Council in ECA D0105R they also encountered the letters of Maria Short.

[73] Popular genealogy and the return movements of roots-tourism as growth industries have engendered commercial activities that can provide and justify economic and digital support for national archives, especially for countries such as Scotland with histories of extensive emigration. Accessible by Internet or at the National Archives General Register House in Edinburgh, *ScotlandsPeople* is a pay-as-you-go database of digitized records created in partnership with FindMyPast.org. On the growth of Internet genealogy, including concerns about privatization through digitization, see Graeme Davison.

[74] Stena Nenadic lists professionals (which she identifies as those employed by the law, the church and medicine) as comprising up to 20% of the middle-class population of Edinburgh in the 1780s, which was double that of other Scottish cities (111). Employees or clerks, as a transitional occupation comprised 7%, and often included lawyers in training (112). TM Devine identifies the "major functions of the capital" as "law, banking and occupation" (39). Lawyers were vital to the representation of Scottish landowners and their economic and political interests given that transferal of governance to London in 1603 (Smout, *A History of the Scottish People*, 110). RH Campbell explains that in the later 18th century, "With the help of astute lawyers the landowners could rig the elections" (97).

[75] On spinsters and the dominant ideology of female dependence, see "I will survive," in Gordon and Nair, *Public Lives* 167-198. Mary Daly "in Cahoots with" Jane Daly, defines a spinster as "a woman whose occupation is to Spin, to participate in the whirling movement of creation; one who has chosen her Self, who defines her Self by choice neither in relation to children nor to men; one who is Self-identified; a whirling dervish, Spiraling in Time/Space" 167.

[76] Senatus Minutes, Vol IV, 444-445, EU Special Collections. Mercy Napier became the Edinburgh University Professor of Conveyancing (property law) in 1825 and acted as the Librarian to the Signet (law) Library from 1805-1837.

[77] The same letter from the professors to Maria Short is reproduced in multiple print campaigns with varying dates making it difficult to determine the letter's date of origin. The earliest date—12 February 1829—appears on two

separate printings: one copied from someone's hand sent to the Duke of Buccleuch in 1829 and another sent to Sir Walter Scott in 1831. See NAS GD224/588/7 and NLS MS 3918 / 65-66.

[78] See Sophia Jex-Blake, "Appendix: A Brief Summary of the Action of Declarator brought by Ten Matriculated Lady Students against the Senatus of Edinburgh University 1872-3," in *Medical Women: A Thesis and A History*, New York: Source Book Press, 1970. On women and medical training in 19th century Britain, see Véronique Molinari. On midwifery training at Scottish Universities before 1830, see Eileen Yeo, "Medicine, Science and the Body" 141-142. On the general exclusion of women from institutions, see Schiebinger. 10-36**.**

[79] The flyer "To the Nobility, Gentry, etc." is not reproduced here but is included with subscription packages kept in Papers of the Montague-Douglas-Scott Family, Dukes of Buccleuch, NAS GD244/588/16,; and Records of the Royal Scottish Society of the Arts, NLS Acc.4534/13. The illustration of Short's Telescope can be found with a copy of Fleming's and the professors' letters, but not the flyer, in the National Library of Scotland Millgate Union Catalogue of Walter Scott correspondence, which is reproduced as figures 7a, 7b, 7c, and 7d. NLS MS 3918/65-66/ or MS 1553 f252; NLS MS 1553 f257.

[80] Fleming uses the term "deserving female" in three letters, see "Thomas Fleming to Adam Luke," 2 June 1828, ECA D0105R; "Thomas Fleming to John Tait," 24 March 1820 and "Subscription Letter by Thomas Fleming", NAS GD244/588/16.

[81] Whereas science historians such as Jessica Riskin and John Tresch centre their explorations of science, sensibility and romanticism on activities in Paris, Holmes uses biographical narrative in his "account of the second scientific revolution, which swept through Britain at the end of the nineteenth century" (xv). William and Caroline Herschel are key figures in Holmes's text, which presents them as the isolated telescope maker and his self-effacing sister. Whereas Holmes attempts to unpack narratives of genius and the "intuitively inspired instance of invention or discovery" (xvii), it is possible to imagine that contemporaneous enthusiasts and supporters of Maria Short projected accounts of the siblings and other savants onto her and her family. See Holmes, *Age of Wonder;* Rifkin*, Science in the Age of Sensibility and* Tresch*, The Romantic Machine.*

[82] Women in astronomy in Germany, as elsewhere, worked beside male relatives, although usually not in official positions. For example, when Maria Winkelmann applied to replace her husband as assistant astronomer in 1710 at the Academy of Berlin, her petition was denied despite having long partnered in his research. See Schiebinger, 79-98. See also Mary Brück*, Stars and Satellites,* 1-7.

[83] Alexander Murdoch and Richard B. Sher argue that "women rarely participated in the world of the Scottish Enlightenment" and that marked "an obvious contrast with the French model" (131). They claim that was gradually changing by the nineteenth century and women ranked "among the authors of the large number of books and articles being produced at Edinburgh in the mid-1820s"–although an observer commented "'several ladies, most of whom are known or shrewdly guessed at; but, like the beauties of Spain, come out veiled'" (133).

[84] On the posthumous repayment of Fleming's debt, see "Praiseworthy Conduct," *The Scotsman*, 12 April 1859, 2; and Charles Dickens (ed),"Found Two Honest Persons" in *All the Year Round*, Volume 1, 21 May 1859, 83. Walter Scott, likewise affected by the financial crisis, also worked to paid his debts instead of declaring bankruptcy ("The Last Years of Sir Walter Scott" in Masson, 205-225). Lingering economic difficulties may have added challenges to Maria's search for benefactors, but may have conversely boosted an interest in admission-based enterprises as alternatives to private ownership of instruments, and costly memberships or annual dues to private societies such as the Astronomical Institution.

[85] I found the address of the Liddell's first theft by checking "Sutherland, D.R" in the 1833-34 Post Office Annual directory for Edinburgh (87), and an online address search indicates that Fleming's factory would have been only a few doors away on the other side of the street.

[86] See "1835 High Court Indictment against William Liddell (Falsehood, Fraud and Wilful Imposition, etc.,)" in NAS AD 14/35/359.

[87] For members of the Astronomical Institution, see "Laws of the Astronomical Institutions of Edinburgh or the Royal Observatory of King George the Fourth, 1829," EU ATT/80.P2/6.

[88] I looked at several instrument catalogues at the British Library, Whipple Museum Library and at Harvard to gain a sense of items being sold. These included listings from Dollond (HU 1790, BL 1818), George Adams (BL 1780), Jas Parkes (BL 1867), Newton and Co (WM 1851, 1893), TH Doublet (BL 1850), Troughton and Simms (WM n.d.), W and S Jones (HU 1837, WM 1850), and Watkins and Hill (BL 1832)

[89] For example, Harvard University owns a book camera obscura bought from Benjamin Martin for £3.13.6. See Millburn, 128-135.

[90] An 1864 advertisement describes the Castlehill camera obscura as being outfitted by First London Makers. (See *The Scotsman*, 25 June 1864) but it is uncertain whether this device is the same installed when Short's Observatory at Castlehill opened in 1855. The camera obscura at Short's Observatory at Calton Hill installed in 1836 is from Dollond of London (See *The Scotsman*, 16 July 1836), but a later handbill identifies the camera obscura being by Davidson (See Short's Observatory handbill, Bill Douglas Museum, University of Exeter, UK EXEBD 12785).

[91] See *The Scotsman,* 26 September 1863, p1. Similar notices appeared in subsequent issues of the newspaper for at least two years. Beginning in 1864, Short also offered tourists a sightseeing map of Edinburgh included in their admission (for example, see *The Scotsman,* 25 June 1864).

[92] See *The Scotsman,* 20 June 1846 for notice of a one-week exhibition of the telegraph, chromatrope and "Drummond Light" (aka limelight). Advertisements for telescopic viewings of the rings of Saturn, Jupiter and Venus first appear in *The Scotsman* 30 April 1836, and again after the reopening of Short's Observatory on Castlehill, 17, 21 and 28 November 1855.

[93] Original records of the Astronomical Institution are kept by the Royal Observatory in Edinburgh, but microfilm copies of the Treasurer's Account Book (1812-1834), Minutes (1811-1847), and loose papers (1840-1850) can be viewed at the National Archives of Scotland, see NAS RH4/153.

[94] Much later than Maskelyne's device at Greenwich but preceding numerous observatory cameras obscura installed elsewhere, it is possible that the Gothic Tower instrument initiated the use of a meniscus lens, which enabled a wider area of focus and the projection of a larger image. In his paper "On a Periscope Camera Obscura and Microscope" presented to the Royal Society in London in 1812, William Hyde Wollaston introduced the meniscus lens, which reduced the loss of focus near its edges and allowed for wider projected image from a camera obscura. An original copy of Wollaston's 1812 paper can be found in the National Library of Scotland among the papers presented to James Veitch (1771-1838), the self-taught astronomer/ploughwright (NLS RB.m.622[1-9].). According to the NLS catalogue description, Veitch had a number of influential acquaintances in Edinburgh and mentored David Brewster (who is listed by the Astronomical Institution as its first secretary). This suggests that the Astronomical Institution camera obscura may have been the earliest to have a meniscus lens

[95] Agnes MacArthur's employment history is recorded in the Astronomical Institution Minutes (Volumes I and II) and Account Book kept in the archives of the Royal Observatory of Edinburgh (AI.3, AI.4, and AI.5) A microfiche copy is stored at the National Archives in Scotland, see NAS AD58/251 and RH4/153.

[96] On the MacArthur's residence see Griffin, *McDowall's new guide to Edinburgh*, 89. On Agnes's request on behalf of John Paul see, Astronomical Institution Minute Book Volume I, 28 April 1830, 285-286, ROE AI.3; NAS RH4/153.

[97] Stevenson describes how the Astronomical Institution originated as a club following the suggestion of a young optician named Mr. Kerr and that he attended the first meeting with a handful of other men, including the Royal Society treasurer James Bonar, which was held at the offices of an accountant named James Ogilvy. Stevenson passed away in June 1850 and was the grandfather of writer Robert Louis Stevenson. James Ogilvy appears among the names of directors for Short's Observatory on two subscription pamphlets from 1834 and 1836, as well as the handbill that dates to the 1840s. I was unable to establish the identity of Mr. Kerr or whether he was any relation to the Thomas Ker who rented Nelson's Monument and installed a popular observatory there in 1849. The same AI archives are recorded on microfilm and kept by the NAS RH4/153.

[98] See 21 Sept 1834, ECA TC Minutes [217] 169-174. Thomas Henderson bore no relation to Robert Henderson who married Maria Short in 1843. However, Thomas Henderson married Janet Adie (daughter of Alexander Adie) in 1836.

[99] Davidson's image of Calton Hill featured in a projected video at the beginning of 2015 exhibition of Victorian photography at the National Museum in Scotland. The video recounted Davidson's first attempt at photographing Calton Hill from his 9th floor residence, wherein he dropped his lens out the window in his excitement. The museum's daguerreotype plate is the likely result of an attempt made by Davidson soon after.

[100] The Royal Society awarded a silver medal to Davidson for his early improvements to photographic processes and lenses, which included a method to rectify image flipping. He supplied optics to Edinburgh (calotype) photographers Hill and Adamson, and also enjoyed support from David Brewster. For more on Davidson, see John Nicol, "Reminiscences of Thomas Davidson, A Weaver Lad," *The British Journal of Photography*, 15 August 1879, p390; 22 August 1879, pp399-401. (With many thanks to Museum Research Associate and Victorian Photography exhibition curator Alison Morrison-Low who suggested the reference and sent me with a high resolution image of Davidson's daguerreotype.)

[101] Extracts from the Dumfries and Maxwelltown Astronomical Society minute books, compiled by the Dumfries Museum indicate that on September 22, 1848, a proposal that the "House and grounds should be opened on the Saturdays to the Working Classes, at the Charge of Three pence each…the motion was put to the vote and was not carried…" (n.p.) In other words, while there was interest in opening the Dumfries observatory to a broader public, it was an exclusive venue for at least the first twelve years of its operation. An information sheet prepared by A.E. Truckell, and available at the Dumfries Museum and Camera Obscura explains that "'Members of the Working Classes' were not officially admitted until the late 1840s, and then only on certain days of the week" (4).

[102] It is uncertain whether the Adie who supplied estimates to the Dumfries and Maxwelltown Astronomical Society was Alexander Adie or his son John Adie. On Adie, Thomas Morton and the Dumfries and Maxwelltown Sociey, see Clarke et al, *Brass and Glass* 43, 191-194 or Hammond, 106-109. The Dumfries Museum and Camera Obscura archive contains several documents relating to Society history, including Minute Books, the First Visitor Guestbook, correspondence and assorted ephemera.

[103] See letter to Robert Thomson, esq from Robert Gordon, 19 February 1835. Dumfries Museum and Camera Obscura, History of the Windmill, Box 1.

[104] The Kilmarnock Observatory was opened to the public, but demolished in 1957. See Clarke et al, *Brass and Glass* 191.

[105] Of Nelson's Monument, Macdonald writes, "One would have thought that so terribly ugly a chimney-like erection as dishonors the memory of Nelson, would have been a warning against further disfigurement of the city." (203).

[106] Robert Louis Stevenson also concluded "it ranks among the vilest of men's handiworks".

[107] On Mrs. Kerr's notice and the re-letting of Nelson's Monument, see ECA TC Minutes [249] 78-79 and 205-208.

[108] The document can be found in the "Papers of George Airy" held at Cambridge University Library, RGO 6 159/420. There is also a photocopy of that flyer kept in the Hammond papers kept at the National Science and Media Museum archive in Bradford, UK. (Thanks to architecture historian Kristin Carter-Mckee, who researched the history of Calton Hill for her dissertation, for alerting me to the existence of the auction catalogue.)

[109] For more on the Adie family, see Clarke et al, *Brass and Glass* 25-65.

[110] I assume that modern time balls, which originated in the mid-nineteenth century at astronomical observatories like Greenwich and Calton Hill, inspired both the New Year's Eve ball drop in New York's Times Square (named for the newspaper and not time-keeping), as well as the one o'clock time signals broadcasted by radio stations (like the CBC) and other media. Time signaling at a distance was facilitated by telegraphy, and local astronomy historians David Gavine and Graeme Rule explained to me that wiring was strung across Edinburgh over rooftops from the Observatory on Calton Hill to Edinburgh Castle to signal the firing of the one o'clock gun. Although mobile networks eliminate the need for time signals, the Edinburgh time ball and gun were revived probably to delight nerds and tourists like me. I still regret declining the invitation from the Nelson's timekeeper to climb the monument with him in 2015 to watch as he dropped the ball.

[111] Images searches include a visit to the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) to look at their collections of illustrations and photographs of Calton Hill. 1849-50.

[112] John Adie had a greater interest in optics than his father, and by the 1840s had increasingly taken charge of the family business. John shot himself in 1857, and Alexander died the following year at the age of 84. See Clarke et al., *Brass and Glass*, 45-47.

[113] One the order to remove Short's Observatory, see *The Scotsman* 12 June 1850. On Maria's response, see *The Scotsman* 19 June 1850.

[114] Nineteenth-century accusations that artists entrenched themselves in an ivory tower, appear here literally founded. An emphasis on height, distance and a rupture with the exterior, seems to echo to the disconnection posited by Kepler between observer and image. The eye, which seems our own, can in fact be as inaccessible as the lost camera obscura in the tower. Note that many cities in England and the United States have a camera obscura, giving rise to a real "towerism/tourism", as an Anglo-Saxon tradition that is still very much alive.

[115] Though his list is far from exhaustive, Hammond also cites nineteenth-century room-size cameras obscura at Brighton, Hull, Llandudno, Liverpool, Plymouth, Ramsgate and South Wales though their connection to astronomical observatories is not always specified (113-117). Hammond also mentions efforts by an amateur society in Glasgow to found an astronomical observatory with a camera obscura although he was uncertain if they succeeded (112).

[116] The Royal Museums Greenwich website presents a short biography of Margaret Maskelyne (1785-1858) in its description of her painted portrait (c1795-98) by William Owen, which is part of its collection (object id. ZBA5104). It reads "A Daughter of the Astronomer Royal, half-length, in a white dress and blue sash, with a dog and Greenwich Park and the Royal Observatory forming the background. Margaret Maskelyne was born in Greenwich on 27 June 1785, the only child of the Reverend Nevil Maskelyne, the 5th Astronomer Royal, and Sophia Rose. She lived at the Observatory until her father's death in 1811, developed a keen interest in astronomy, and assisted him with his observations. In 1819 she married Anthony Story (1791-1879), who formally changed the family name to Story-Maskelyne in 1845 when they inherited the Maskelyne lands in Dorset and Wiltshire […]The view of the Observatory and the deer grouping in the background are similar to and may be based on a drawing by Owen (ZBA5103), which was also previously a family item."
(http://collections.rmg.co.uk/collections/objects/562251.html Retrieved 30 August 2017.)

[117] On the mid-nineteenth century observatory camera obscura in South Africa, see "An Architectural Oddity" posted 28 January 2014 in Grahamstown and Frontier Country, Makana Tourism website c2017, http://www.grahamstown.co.za/news/an_architectural_oddity Retrieved 30 August 2017.

[118] An observatory is generally a square building, situated and erected on an eminence, and at the extremity of which a terrace is made for astronomical observations. Quite often, on this terrace, a keep is constructed to contain the instruments and to carry out physical experiments. These monuments of utility are constructed with more or less grandeur and magnificence, according to the importance of the Capitals or the great princes that raise them. Their interiors have different uses. Along with large halls for scholarly assembles, there may be laboratories, a library, and physics cabinets in their interior. Finally there is a dwelling and furnishings for the Director; also for a caretaker, and for the instrument makers. Large terraces surrounding the building are used to set up telescopes when weather if fine, which, because of their size, cannot be mounted inside.

[119] The "New Observatory" appears on the left of the key of Barker's panorama exhibition at Leicester Square that is reproduced as figure 1.4 in Oleksijczuk, page 31. The image credit reads: "T. Lane after Henry Aston Barker, *View of Edinburgh and the Surrounding Country*, 1805. Engraving key."

[120] Michael John Gorman speculates that Scheiner may have also used a camera obscura-type system, but hid his method, alongside his identity, using the pseudonym *Apelles post tabula latens*, which translates to Apelles hiding behind the painting or the projection screen (36).

[121] Winkler and Van Helden argue that Galileo's shift from the use of illustrations in his treatises went along with his improved status. They explain, "words and mathematical symbols and diagrams had been the standard media in learned tomes for centuries," whereas "pictorial representation of any kind in scholarly communications" (with the exception of fields such as anatomy, botany and geography) was "controversial in court circles" (211). They argue that Galileo likewise gave little credence to the invention of the telescope, but rather claimed credit for its intellectual theorization and not its "material production" (214). Instrument-making was an "anonymous craft tradition" (212), so when Hans Lipperhey, a Dutch spectacle-maker, applied for the first patent in 1608, reports of his invention circulated through Europe but there was interest in his identity. The use of illustration as

astronomical evidence became common after 1640, in particular with images of lunar phases by Johannes Hevelius (216).

[122] The Oxford English Dictionary assigns to 'visuality' four meanings: 1) The state or quality of being visual or visible to the mind; mental visibility; 2) A mental picture or vision; 3) Vision, sight; and 4) Visual aspect or representation; physical appearance. While the OED identifies the origins of the latter two definitions with twentieth-century writers, for each of the first two senses, it cites two uses by Carlyle. The word's earliest usage appears in Carlyle's "The Hero as Poet" lecture, and in praise of Dante's Inferno. Because he never defines visuality, his meaning can only be gleaned from its context. Carlyle writes, "But, as I say, no work known to me is so elaborated as this of Dante's. It has all been as if molten, in the hottest furnace of his soul. It had made him "lean" for many years. Not the general whole only; every compartment of it is worked out, with intense earnestness, into truth, into clear visuality. Each answers to the other; each fits in its place, like a marble stone accurately hewn and polished. It is the soul of Dante, and in this the soul of the middle ages, rendered forever rhythmically visible there. No light task; a right intense one: but a task which is *done"* (*On Heroes* 89-90 underlined emphasis added).

Carlyle also uses the word to mean "mental picture" in essays from 1841 and 1845, and in his 1858 History of Friedrich II of Prussia, to describe the ability of Friedrich Wilhelm to envision his own funeral. In each case, visuality appears only once and without elaboration.

Explaining that the Scottish historian was "opposed to Chartism, panopticism and all the emancipatory movements that stemmed from the French Revolution" ("On Visuality" 54), Mirzoeff asserts that "Carlyle argued that only the hero had the vision to see history as it happened, a viewpoint that was obscured for the ordinary person by the spectres and phantasmagorias of emancipation" (57). Carlyle's hero lectures were intended as a "spiritual antidote" to the scientific modernity he criticized in *Sartor Resartus*, and are "supportive of imperialism" in its recognition of the in(ner)sight gifted to great men (55).

[123] Carlyle writes, "I confess, I have no notion of a truly great man that could not be *all* sorts of men" (*On Heroes* 77, original emphasis). However, he means that a great man could do anything, not that all men could be great. "The hero can be poet, prophet, king, priest or what you will, according to the kind of world which he finds himself born into" (Ibid).

[124] On the writing and publications of *Sartor* and their receptions, see James Secord, *Visions of Science*, 205-235 and Frank M. Turner "Victorian Scientific Naturalism and Thomas Carlyle."

[125] In his 2006 article "On Visuality" for the *Journal of Visual Culture*, Mirzoeff tries to reconcile Carlyle's notion of an "embodied Hero as the agent of visuality" with Crary's model of an embodied observer (60). Carlyle's identification of, and with, Goethe as the "Hero as the Literary Man" (*On Heroes* 150), and the multiplicity of readings presented by J.M.W. Turner's painting *Light and Colour (Goethe's Theory) – The Morning After the Deluge– Moses Writing the Book of Genesis* (1843), complicates this relation. Mirzoeff's suggests an understanding of Turner's painting as "a struggle with visuality" as a kind of resolution (61-62). However, Carlyle's fascination with camera obscuras, and with Goethe, problematizes an identification of Goethe with Crary's modern observer. According to Crary, with the *Farbenlehre (Theory of Colours*) study of retinal afterimages published in 1810, Goethe "abruptly and stunningly abandons the order of the camera obscura (68). Mirzoeff notes that, "Carlyle was explicitly opposed to the new physiology of vision," which Goethe's research apparently heralded (56). And while Carlyle and Goethe shared a friendly correspondence between 1824 and 1831, which indicates that Goethe sent Carlyle a copy of *Farbenlehre* in 1829, I found no record of Carlyle's impressions of the text (see *The Carlyle Letters Online*).

In “The Hero as Divinity,” ‘camera-obscura” appears three times to represent the exaggeration of Odin from man into myth: “And then consider what mere time will do in such cases; how if a man was great while living, he becomes tenfold greater when dead. What an enormous camera-obscura magnifier is tradition! How a thing grows in the human memory…To attempt *theorizing* on such matters would profit little: they are matters which refuse to be *theoremed* and diagramed ; which logic ought to know she *cannot* speak of. Enough for us to discern, far in the uttermost distance, some gleam, as of a real light shining in the centre of that enormous camera-obscura image; to discern that the centre of it all was not a madness and nothing, but a sanity and something” (*On Heroes* 28, underlined emphases added).

And Carlyle furthers,“In gigantic confused linaments, like some enormous camera-obscura shadow thrown upwards from the dead deeps of the past, and covering the whole northern Heaven, is not that Scandinavian mythology in some sort the portraiture of this man Odin? “(31).

Mirzoeff notes Carlyle’s association of a camera obscura with tradition (“On Visuality” 60). Yet, Carlyle used the term more broadly and more often than visuality. For example, in a letter written in 1821, he encourages his brother to be more social by urging “Go out, I bid you, from the camera obscura of Bitty Geel [his landlady’s]; go out frequently, and talk…” (TC to John A. Carlyle, 19 July 1821, *The Carlyle Letters Online*). And questioning the validity of Teufelsdröckh’s paper-bag archive, his *Sartor Resartor* “Editor” asks “What if many a so-called Fact were little better than a Fiction; if here we had no direct Camera-obscura Picture of the Professor’s History; but only some more or less fantastic Adumbration, symbolically, perhaps significantly enough, shadowing forth the same!” (161 underlined emphasis added).

[126] Truckell counts Thomas Carlyle as one of the more enthusiastic visitors to the newly opened Dumfries camera obscura, citing the appearance of his name multiple times on the opening pages of its guestbook. “Thomas Carlyle” is inscribed there on August 5 and 9, 1836, just days after the camera obscura opened to the public (DM 0198.124). Given that Carlyle came from Dumfries and lived there with Jane Welsh, also from the area, his visiting would not be unsurprising. However, correspondence by the couple indicates that Jane Welsh visited Scotland during summer 1836, but Thomas Carlyle did not. Moreover, the handwriting of the guestbook signatures is far neater than the handwriting of either of the Welsh-Carlyles. Perhaps a different Thomas Carlyle was a fan of the Dumfries device, or perhaps someone wrote his name in the guestbook for some other reason. However, that does not mean that Carlyle did not visit the Dumfries camera obscura on other days. Society minutes for 24 October 1839 record the firing of camera keeper Mr. Thompson for overcharging and admitting strangers, and pocketing admission fees for unrecorded visits (Minute Book Volume 1, n.p. DM 0201.15). For the Carlyle locations during August 1836, see *Carlyle Letters Online,* volume 9.

[127] A case for connection between optical instruments and visualization is furthermore made by what Froude designated as Carlyle’s “Spiritual Optics.” Carlyle wrote, “The effects of *optics* in this strange camera obscura of an [or our] existence are most of all singular!” for they reveal “a divineness lying much nearer home than formerly” (Baumgarten, 514).

[128] Its manager allowed me to visit and see the inside of the Gothic Tower (aka Old Observatory) on Calton Hill in 2013, when it was owned and operated by Vivat Trust.

[129] “Thus an optical instrument, perhaps the finest in the world, is lost for want of a proper place to kept it in; and the observatory stands a half-finished work upon the highest hill of Edinburgh, speaking this emphatick language to the eye of every beholder : ‘Here is a building, which the folly of its contrivers led them to begin, without considering, that, by their poverty, they were unable to finish it’.” See Arnot, 320.

[130] Morrison-Low and Stevenson are cautious about attributing the use of the camera obscura by specific artists, arguing that in most cases it is impossible to verify direct use of the device (5). However, Keith Cavers argues that Slezer likely used a tent camera obscura citing "pinpoint accuracy" in some of the perspectives and a high angle of view. Considerable inconsistencies appear in the drawings caused by "piecemeal arrangements" drawings, including combined perspectives, the addition of human and animal figures frequently out of scale and sometimes repeated; and the combination of artists and engravers that produced the final work (6-9).

[131] Oetterman contends that panorama sketches could take "weeks to complete" and would be achieved with different kinds of mechanical aids. Alternatives to a costly assembly like a rotating camera obscura mounted on a tripod, an artist might use a simple gridded frame to render a transcription or a camera lucida, patented by Henry Wollaston in 1806, see Oetterman, 51. On the possibility that Barker used a camera obscura to make his drawings see Sara Stevenson, 215.

[132] For a short account of Caldwall's life, see "John Caldwall," Blackwood's Magazine, Vol 6 (Feb 1820) 607.

[133] Samuel Johnson published *A Journey to the Western Islands of Scotland* in 1775 and James Boswell published *A Journal of a Tour to the Hebrides with Samuel Johnson* in 1785. In his journal entry for August 18, 1773, Boswell referred to the view from Calton Hill writing, "When we came to Leith, I talked with perhaps too boasting an air, how pretty the Frith of Forth looked; as indeed, after the prospect from Constantinople, of which I have been told, and that from Naples, which I have seen, I believe the view of that Frith and its environs, from the Castle Hill of Edinburgh, is the finest prospect in Europe. 'Ay,' said Dr Johnson, 'that is the state of the world. Water is the same every where."

Picturesque travel writer Gilpin also assessed the geography and character of Scotland to be romantic in general (59-66). Having toured Scotland in 1776, he omits Calton Hill and discusses the city's two other elevations. Gilpin thought "amazing pile" of Castlehill afforded "very amusing views," but contended "he who would see Edinburgh-castle in perfection, must go to the *bottom* of the rock, it stands on, and walk around it" (Emphasis added, 62)., He judged Arthur's Seat from a distance as "romantic, but not picturesque," and although he recorded no attempt to climb it, he commented "I have often conceived myself about to ascend some stupendous mountain, which dwindled on a near approach, into a mere hill" (53).

[134] The years 1795 and 1796, when two Short women (Jacobina Downie and the wife of James Douglas, Elizabeth Beverly) died with husbands abroad on military campaigns, saw famine and riots throughout the UK. Bad weather resulted in poor wheat crops, war interrupted trade and prices soared with profiteers taking advantage of the increased reliance on bread. Lord Cockburn wrote "On the 4th of March 1795 about eleven thousand persons, probably about an eighth of the population, were fed by charity in Edinburgh," while wealthy houses used dishware designed to resemble baked goods as a way to endure rationing, and powdered their hair with only inedible whiteners (*Memorials*, 65-67).

[135] Carlyle writes, "Benthamism is an *eyeless* heroism : the human species, like a hapless blinded Sampson, grinding in the Philistine mill, clasps convulsively the pillars of the mill : brings huge ruin down, but ultimately deliverance withal. Of Bentham I meant to say no harm. But I do say, and would wish all men to know and lay to heart, that he who discerns nothing but the mechanism in the universe has in the fatalist way missed the secret of the universe altogether (*On Heroes* 164, original emphasis).

[136] On the conditions of Maria Short's lease, see 10 Jun 1834, ECA TC Minutes [216] 249-250.

[137] *Northampton Mercury*, 14 June 1800, p3, 28 June 1788 p1; *Caledonian Mercury,* 25 July 1789, 1. Similarly worded advertisements also appear in the *Bath Chronicle and Weekly Gazette* (20 Dec 1787, 2). The *Northampton Mercury* ad claims the camera obscura is from Long-Buckby (in Northampton), whereas the provenances of the exhibition in the *Caledonian Mercury* and *Bath Chronicle* ads are respectively Cambridge and London.

[138] See Colosseum advertisement, *The Morning Post,* 1 Sept 1836, 2. On reviewing renovations at the Colosseum in 1846, a report in the *Cornwall Royal Gazette* explained that, "by day a magnificent view of the real London is affording from the roof of the building, which the spectator may observe, if he will, in a gigantic camera obscura." See *Cornwall Royal Gazette.* 17 July 1846, 4.

[139] Dubrofsky and Magnet write about Foucault's discussion of surveillance as "statecraft" and "internalized surveillance captured by the spatial landscape of the Panopticon" (2) and they mention Mulvey's "foundational work on the 'male gaze' (10). Van Meulen and Heynen discuss Mulvey in more detail, describing how Mulvey argued that "women have been configured in film through a "to-be-looked-at-ness" (11), but that the theory of the 'male gaze' has since been challenged for its "monolithic character" since it ignores race and other differences (12). Of Foucault, they write that Feminists scholars have often found his "genealogies of sexuality or medicine" "more compelling" than his carceral model, which is also presumed to be more oriented towards men (7).

[140] Other seaside cameras could be found at Coney Island and the Ocean Grove Boardwalk in New Jersey. See also "Images of Lost UK Seaside Cameras obscura," and "Images of Lost US Seaside Cameras obscura" in Wilgus and Wilgus.

[141] For notices for the camera obscura at Rothesay Aquarium, see *The Scotsman*, 18 July 1776, 12 July 1776 and 12 August 1776. For other examples of Portobello Pier notices that feature its camera obscura, see *The Scotsman*, 11 June 1880, 17 June 1882. See also, David McLean, "Lost Edinburgh: Portobello Pier," in *The Scotsman*, 31 March 2014. www.scotsman.com/lifestyle/heritage/lost-edinburgh-portobello-pier-1-3358999. Web. 5 Jan 2015.

[142] "Camera obscura" is the title of the third chapter of Bill Landis's unauthorized biography of Kenneth Anger, the avant-garde filmmaker who is also well known for authoring *Hollywood Babylon*, which chronicles various movie industry scandals. While Anger ironically refused to participate in Landis's project—calling his "purported" biographer "an avowed enemy," his older brother Bob Anglemyer explained to Landis, among other things, how a young Anger had been arrested at the Santa Monica camera obscura in a police sting aimed at men having gay sex (37). Landis characterizes the event as a turning point. Further humiliated by an angry father that reported the incident to their entire family, the arrest resulted in the university student moving from his family home, changing his name, and initializing his exploration of queer sexuality through filmmaking. Landis writes, "He was also publicly embracing the beliefs of occultist Aleister Crowley. By way of alchemy, of turning excrement into gold, he would transform the shattering, traumatic camera obscura incident into an ecstatic magical experience" (39). Douglas Cammell, the son of Crowley's biographer and friend poet and writer Richard Charles, also made films that explored sexuality and identity. He played Osiris in Anger's *Lucifer Rising* (1972) and began his life under Edinburgh's Camera Obscura—having been born in Outlook Tower in 1934. On Cammell, see Chang, Chris. "Donald Cammell." Film Comment, 1996 and "A Cut above." *The Guardian*, January 14, 2000, sec. Film. https://www.theguardian.com/film/2000/jan/14/2. As of 2017, the Santa Monica camera obscura is operational and open to the public.

[143] On rumours regarding the asexual nature of the Carlyle marriage see "The Allegations of Carlyle's Sexual Impotence" in the "Harris, Frank" entry in Cumming, 210-211. Cumming explains that the rumour was first recorded by Carlyle's biography Anthony Froude who attributed it to a doctor of Jane Welsh Carlyle, which was

swiftly denied by another physician James Crichton-Browne, citing professional discretion. Writer Frank Harris who had befriended Carlyle, claimed that Carlyle had confessed his impotence and after being accused of fabricating the conversation, published a more detailed account in *My Life and Loves* (Ibid). Aileen Christianson argues that the Carlyles likely had a physical relationship for at least a time since, Jane thought herself pregnant in 1831 and suggests that the rumours "were more to do with the posturing of the defenders on each side in the marriage (71).

[144] The similar of framings and compositions suggests that the image of a couple caught on a bench in an intimate embrace may have be a visual trope that carried over from other media, such as postcards, stereocards or lantern cards. The scenario is also reminiscent of an early film distributed in 1899 Haydon and Urry Ltd as *On the Benches in the Park* or *Courtship*. David R. Williams discusses how the film was at the centre of a breach of contract case concerning censorship, see "'What the Vicar Saw' or 'The Kiss in The Park'" in *Visual Delights two*. Huhtamo calls visual motifs that recur across time and different media "topoi" (*Illusions in Motion* 16-17; and "Dismantling the Fairy Engine: Media Archaeology as Topos Study" in Huhtamo and Parikka, eds. 27-47).

[145] The Cyclorama of Jerusalem is one of the only panoramas worldwide that can be seen in its original rotunda. Molly Ann Rotheschild and I visited the Cyclorama in September 2015, and we looked at it while listening to the pre-recorded audioguide. Our disorientation occurred at end of the panoramic/audio tour when we thought we had seen only half of the painting when in fact we had turned full circle. Université de Laval professor Jean-Pierre Sirois-Trahan is presently researching the Cyclorama and was instrumental in getting it listed as a historic provincial monument, after concern that the owner's need to sell would mean its loss. See Angela Montgomery, CBC News, "Canada's last cyclorama, 19th-century precursor to Imax gets protected status" updated 15 Aug 2017, http://www.cbc.ca/news/canada/montreal/quebec-cyclorama-building-status-1.4246586

[146] The perspective box by Samuel Van Hoogstraten at the National Gallery in London places a single eye of its viewer at one of two peepholes situated the same level of its principal vanishing points and presents a "multifocal field of view rather than a unified space organized around a central vanishing point" (Brusati "Perspectives in Flux" 917). As I discussed in my review of camera obscura literature, Van Hoogstraten wrote about the camera obscura in his painting treatise, and while he did not discuss its use, his images of cast, anamorphic shadows may be a clue to the perspective box construction. Objects in his perspective box appear to float in its hollow, central space, even though they are distorted images painted on its inner walls. They are anamorphic projections that would take the exact same appearance on the walls, if the box were a camera obscura that emitted sunlight at its peephole instead of the viewer's eye. On the technical aspects of Van Hoogstraten's "Peepshow", see David Bomford.

[147] In *Picturing Space, Displacing Bodies,* Lyle Massey argues that as a form of perspective that relies on the same geometric principles of construction, anamorphosis demonstrates that all perspective communicates a specific and located point of view. Anamorphosis therefore undermines discourses of disembodiment and transcendental points of view often associated especially with quattrocento (or Cartesian) perspective.

[148] With its eleven lenses, the 1892 Grand Union Camera Obscura at Douglas Head on the Isle of Man is an exception to the sequential nature of camera obscura imagery. Its screen is partitioned to simultaneously show eleven views of the surroundings. See "Grand Union Camera Obscura" at *The official visitor website of Isle of Man* https://www.visitisleofman.com/things-to-do/great-union-camera-obscura-p1292471 Retrieved 17 Sept 2017.

[149] A newspaper article reported "large numbers of visitors staying in and passing through Edinburgh," with Outlook Tower and its camera obscura as a "growing centre of attraction." It also mentioned the occupation of three of its floors in August 1945 by the Central and South-East Scotland Regional Planning Advisory. See *The Scotsman*, 27 April 1946.

[150] Antony Wolffe came to the attention of Andrew Johnson, the manager of Edinburgh's Camera Obscura when a medal that he should have received in 1944 from the Edinburgh College of Art was finally given to him in 2015, and several news outlets reported his story. Johnson passed Mr. Wolffe's contact information to me and we arranged a meeting on July 9, 2015 at the Dumfries Museum, near his home. Mr. Wolffe gave me copies of his papers connected to the renovation of the Edinburgh camera obscura. It was the year before he passed away. He had deposited his records with the RCAHMS Archive in Scotland, and I had the copies he gave to me added to the vertical file on Patrick Geddes (Outlook Tower) held by the Canadian Centre for Architecture in Montreal. On Antony Wolffe, see also James Wolffe, "Obituary: Antony Curtis Wolffe, MBE, architect and town planner," *The Scotsman*, 11 February 2016. http://www.scotsman.com/news/obituaries/obituary-antony-curtis-wolffe-mbe-architect-and-town-planner-1-4028195

[151] Andrew Johnson took me into the upper room where the Edinburgh camera obscura was located before the site's 1947 renovation. There is a hatch that opens to the roof that is used for the maintenance of the exterior parts of the current device.

[152] In *Surface: Matters of Aesthetics, Materiality and Media* (2014) Giuliana Bruno, explores the haptic and material qualities of and on screen, in relation to contemporary cinema and installation art. In chapter 6 "Sites of Screening" (143-165) Bruno reflects on the cinema and museums as "institutions of visual knowledge" and their shared origin in "an era that activated the gaze in sequence, mobilized and narrativized (object) space" (144). She contends that interior "filmic architecture" emerged from "early museological spectacles and practices of curiosity" (152), which current postcinematic installations in museums and galleries recall. However, Bruno discusses "haptic materiality" (158) in a less concrete fashion than Strauven, Classen and Candin, writing "space is an intimate fabric…to occupy museum space is, literally, to wear it" (159).

[153] Though incorrectly attributed to G. Best, the image of "Washerwomen on the Calton Hill" is embedded in the Wikipedia entry for Calton Hill.

[154] Cockburn also mentions a defeated proposal to move the place of public executions to the roof of the Calton jail so that instead of packing crowds in the street, people could enjoy the spectacle from the slopes of Calton Hill ("Letter to the Lord Provost" 13-14).

[155] Macdonald writes, "On the north slope [of Calton Hill] linen was washed, and the ground slopped around water-cocks, which should have never been allowed to disfigure the scene. The washings were hung up on ropes stretched on shabby, badly set-up poles, disfiguring the view in a manner altogether shameful (199).

[156] It is possible that Cockburn also made an association between laundry and the "fallen women" of the Magdalene Laundries—institutions for the reform of women identified with prostitution, deviancy or its potential. See Linda Mahood, "The Magdalene's Friend: Prostitution and Social Control" and S. Karly Kehoe "Crime and Punishment, Immorality and Reform" in Breitenbach et al, *Scottish Women: A Documentary History*, 191-201.

[157] Davidson explains that before prohibitively high soap taxes were lifted in 1853, women would use it in combination with lye or different types of freely available cleaning agents, such as ammonia from stale urine (141-42). Since working class communities would sometimes collect urine for cleaning in communal barrels, that may have contributed to urban stinks.

[158] Nasmyth came from a family of artists with a broad social circle that included other artists, poets, professors and especially those interested in optics and the study of light. His father Alexander Nasmyth, a landscape painter

and art teacher (whose students included writer/mathematician Mary Somerville), had submitted a proposal to redesign Calton Hill in the 1813 competition and is listed as a proprietor on Astronomical Institution documents. Both Alexander and James are named as patrons in the Short's Observatory subscription pamphlets. On the Nasmyths, their clique and optics in Edinburgh, see Morrison-Low and Stevenson, *Scottish Photography*, 8-11. On James Nasmyth's implication in early Scottish photography, Ibid 16.

[159] Geddes applied his training as a botanist and evolutionary biologist to support his biologically deterministic understanding of gender and opposition to women's voting rights. In *Evolution of Sex* (1889), Geddes argued that women should not have the vote because biology had pre-determined their role, see Meller, 59. Geddes also advised single women, in the absence of marriageable men, to redirect their maternal instincts and energies to programs of social improvement (Geddes "Women, the census and the possibilities of the future"). Helen Meller observes that numerous women contributed Outlook Tower initiatives, and comments on the freedom of Geddes's "New Woman […]to fulfil her biological destiny as wife, companion and ideal mother […and] her role to inspire her man, to know intuitively what needed to be done; to nurture cultural and spiritual values" (5). Ponte and Levine furthermore note, but do not expand on, parallel notions, as well as direct ties, between Geddes (1854-1932), and eugenicists Karl Pearson (1857-1936) and Francis Galton (1822-1911) (51).

[160] Burton and Fraser likewise discuss embodied, surveillant and voyeuristic aspects splendid camera obscuras, inspired by descriptions of Outlook Tower by art historian Vernon Lee (1856-1935), and produced a short film in connection to their article. Fraser discusses Lee's influence as an art critic and her promotion of an embodied form of gendered spectatorship in relation to Crary's *Techniques of the Observer* in another article called "Women and the Ends of Art History." However, Lee became active only near the turn of the twentieth century so I have left her writing out of this discussion, although Fraser and Burton's analysis was an early inspiration.

[161] On the absence of memorials to women in Scotland, see also Dani Garavelli "Where are the statues of Scots women?" in *The Scotsman online*, posted 16 January 2016. See http://www.scotsman.com/news/where-are-the-statues-of-scots-women-1-4009631 (Retrieved 30 August 2017).

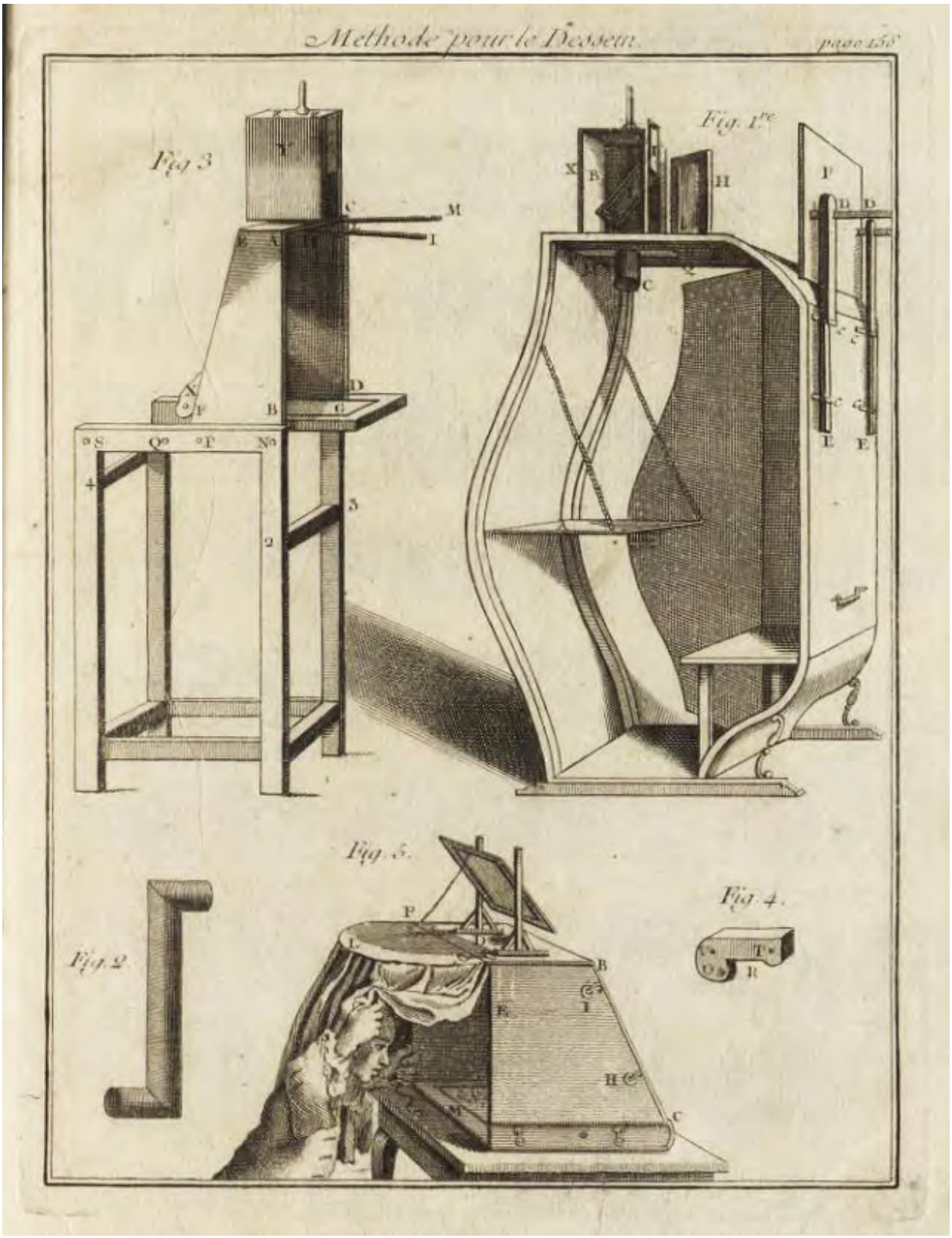
[162] Since the right to look is the right to redefine the terms of visuality, what qualifies as the "real" becomes part of the right of self-determination and definition. Mirzoeff however explicitly rejects Agamben's formulation of "bare life," arguing that rights can never be wholly given up (*Right to Look* 24-25), and moreover questions the absence of slavery from Agamben's analysis, which admits no politicization of life before a notion of "rights" declared in 1789 (312n23, 313n68).

[163] See Burgh Register of Sasines for Edinburgh NAS B22/4/64, 17.

[164] The Burgh Register of Sasines for Edinburgh lists multiple purchases of Old Town properties by Patrick Geddes during the late 1880s to mid1890s. Geddes and his associates were buying, renovating and moving into old rundown tenements as part of their efforts to study and improve living conditions in that part of Edinburgh. He may have come upon the sale of Short's Observatory by chance at an auction of tenements.

Figures

Figure 1. C.A. Jombert, Camera obscuras for drawing.
(*Méthode pour apprendre le dessin.* Paris: A Jombert, 1784, 156.)



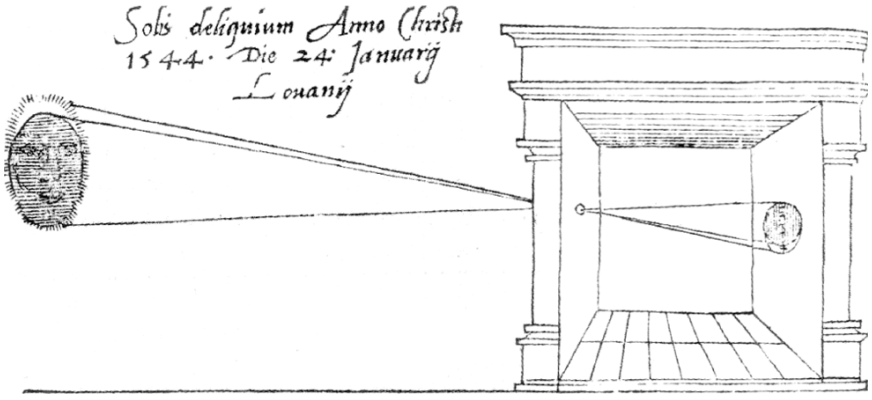


Figure 2
Gemma Frisius,
De Radio Astronomica et Geometrica, 1545

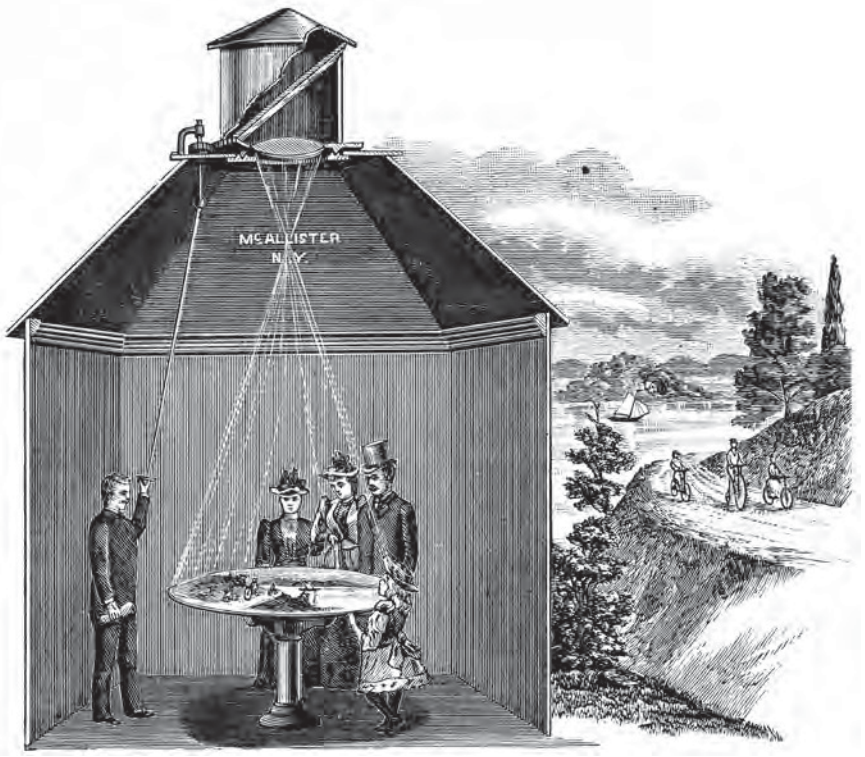


Figure 3
A splendid camera obscura (from a McAllister instrument catalogue), date unknown
(in S.H. and H. P.Gage, *Optic Projection: Principles, Installation and Use of the Magic Lantern, Projection Microscope, Reflecting Lantern, Moving Picture Machine.* Ithaca, NY: Comstock, 1914, 167.)

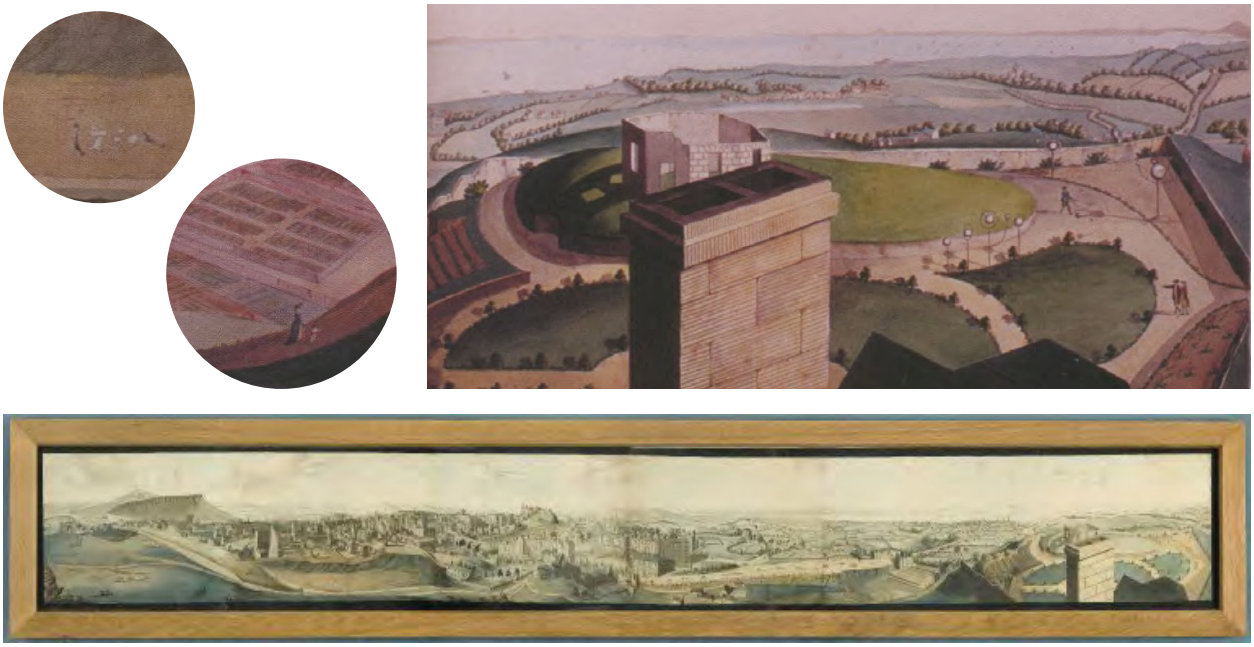


Figure 4
(top) John Slezer, *The North Prospect of the City of Edenburgh* 1719 (*Theatrum Scotiae*).

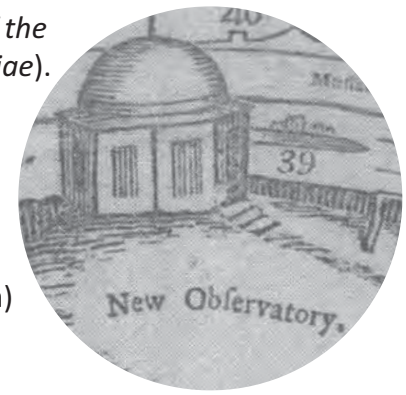
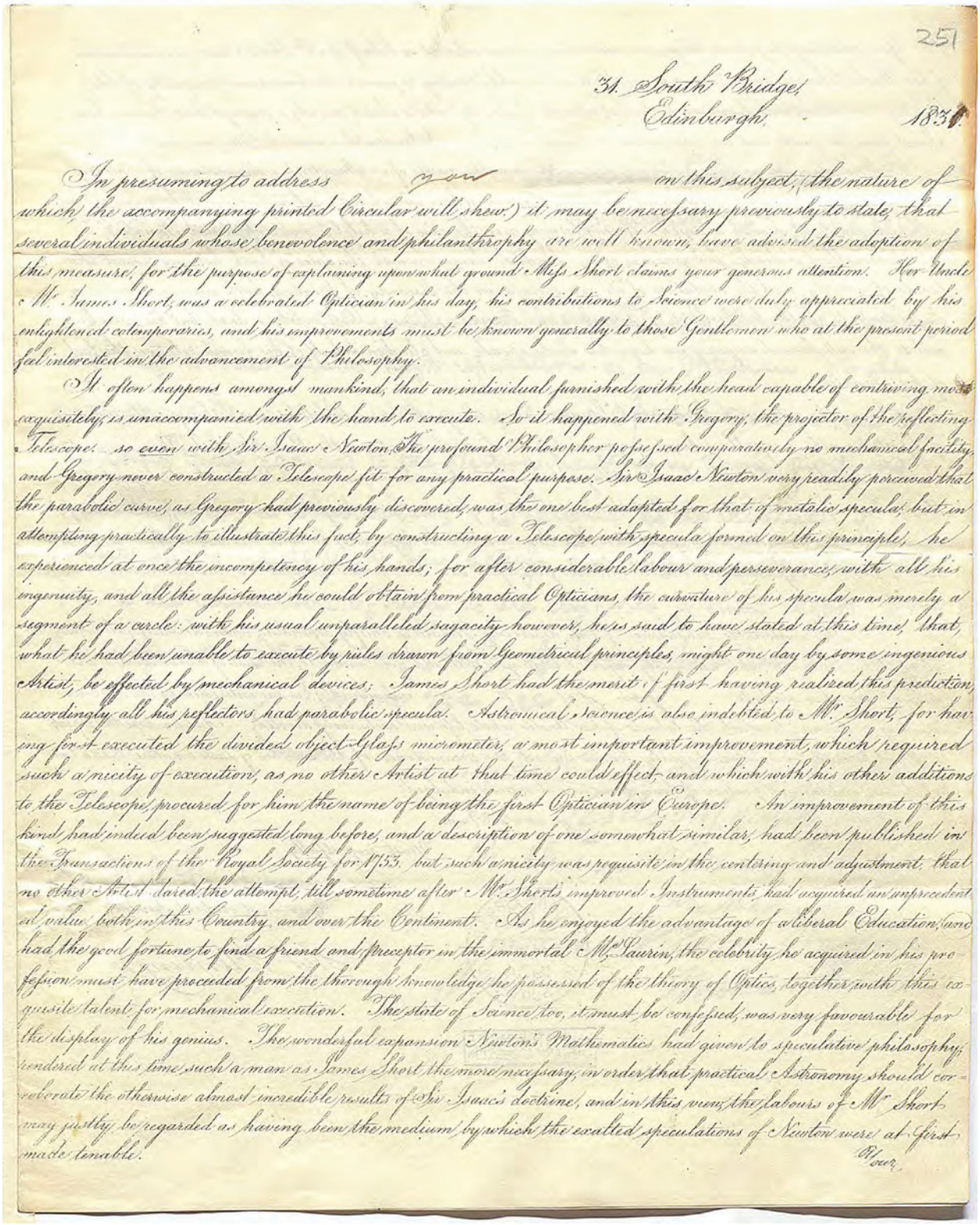


Figure 5
(centre and details) John Wells after Robert Barker, View of Edinburgh and the Surrounding Country from the Calton Hill, 1789-90 (UE & City Museum)

Figure 6
(bottom and detail) T. Lane after Henry Aston Barker, View of Edinburgh, key 1805 (NLS)

Figure 7a (1 of 4)
Great Telescope letter campaign, 1831 (NLS 15616 / MS 3918 / 65-66)



251

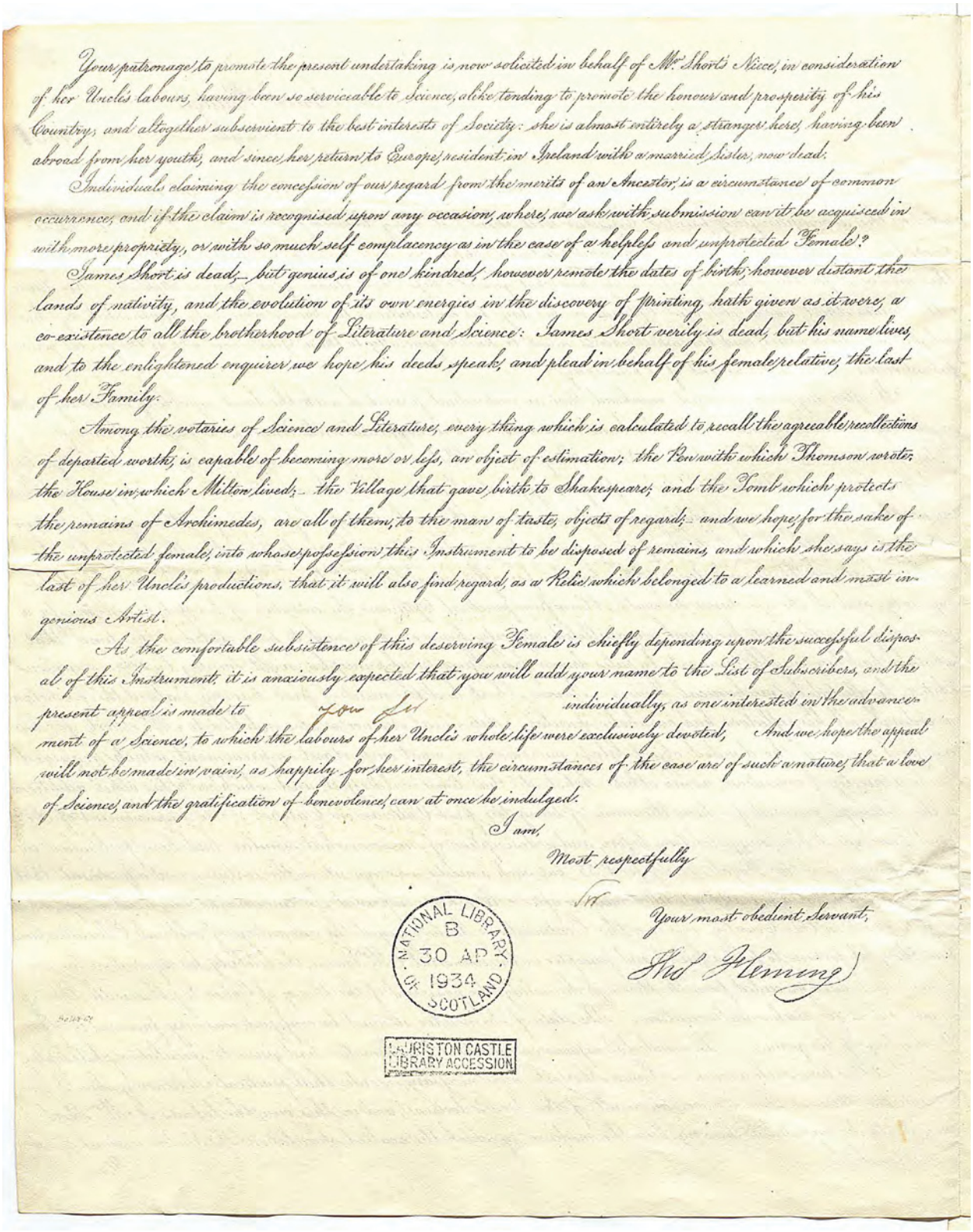
34 South Bridge,
Edinburgh,
183[illegible]

In presuming to address you on this subject, (the nature of which the accompanying printed Circular will shew) it may be necessary previously to state, that several individuals whose benevolence and philanthrophy are well known, have advised the adoption of this measure, for the purpose of explaining upon what ground Miss Short claims your generous attention. Her Uncle Mr James Short, was a celebrated Optician in his day, his contributions to Science were duly appreciated by his enlightened cotemporaries, and his improvements must be known generally to those Gentlemen who at the present period feel interested in the advancement of Philosophy.

It often happens amongst mankind, that an individual furnished with the head capable of contriving most exquisitely, is unaccompanied with the hand to execute. So it happened with Gregory, the projector of the reflecting Telescope: so even with Sir Isaac Newton. The profound Philosopher possessed comparatively no mechanical facility, and Gregory never constructed a Telescope fit for any practical purpose. Sir Isaac Newton very readily perceived that the parabolic curve, as Gregory had previously discovered, was the one best adapted for that of metalic specula; but in attempting practically to illustrate this fact, by constructing a Telescope with specula formed on this principle, he experienced at once the incompetency of his hands; for after considerable labour and perseverance, with all his ingenuity, and all the assistance he could obtain from practical Opticians, the curvature of his specula was merely a segment of a circle: with his usual unparalleled sagacity however, he is said to have stated at this time, that what he had been unable to execute by rules drawn from Geometrical principles, might one day by some ingenious Artist, be effected by mechanical devices. James Short had the merit of first having realized this prediction, accordingly all his reflectors had parabolic specula. Astronomical Science is also indebted to Mr. Short, for having first executed the divided object-glass micrometer, a most important improvement, which required such a nicity of execution, as no other Artist at that time could effect, and which with his other additions to the Telescope, procured for him the name of being the first Optician in Europe. An improvement of this kind had indeed been suggested long before, and a description of one somewhat similar, had been published in the Transactions of the Royal Society for 1753. but such a nicity was requisite in the centering and adjustment, that no other Artist dared the attempt, till sometime after Mr Shorts improved Instruments had acquired an unprecedented value, both in this Country and over the Continent. As he enjoyed the advantage of a liberal Education, and had the good fortune to find a friend and preceptor in the immortal Mr Maurin, the celebrity he acquired in his profession must have proceeded from the thorough knowledge he possessed of the theory of Optics, together with this exquisite talent for mechanical execution. The state of Science too, it must be confessed, was very favourable for the display of his genius. The wonderful expansion Newton's Mathematics had given to speculative philosophy, rendered at this time such a man as James Short the more necessary, in order that practical Astronomy should corroborate the otherwise almost incredible results of Sir Isaac's doctrine, and in this view, the labours of Mr Short may justly be regarded as having been the medium by which the exalted speculations of Newton were at first made tenable.

Over

Figure 7b (2 of 4)
Great Telescope letter campaign, 1831 (NLS 15616 / MS 3918 / 65-66)



Your patronage to promote the present undertaking is now solicited in behalf of Mr. Short's Niece, in consideration of her Uncle's labours, having been so serviceable to Science, alike tending to promote the honour and prosperity of his Country, and altogether subservient to the best interests of Society: she is almost entirely a stranger here, having been abroad from her youth, and since her return to Europe, resident in Ireland with a married Sister, now dead.

Individuals claiming the concession of our regard from the merits of an Ancestor, is a circumstance of common occurrence, and if the claim is recognised upon any occasion, where, we ask with submission can it be acquiesced in with more propriety, or with so much self complacency as in the case of a helpless and unprotected Female?

James Short is dead; but genius is of one kindred, however remote the dates of birth, however distant the lands of nativity, and the evolution of its own energies in the discovery of printing, hath given as it were, a co-existence to all the brotherhood of Literature and Science: James Short verily is dead, but his name lives, and to the enlightened enquirer we hope his deeds speak, and plead in behalf of his female relative, the last of her Family.

Among the votaries of Science and Literature, every thing which is calculated to recall the agreeable recollections of departed worth, is capable of becoming more or less, an object of estimation; the Pen with which Thomson wrote; the House in which Milton lived; the Village that gave birth to Shakespeare; and the Tomb which protects the remains of Archimedes, are all of them, to the man of taste, objects of regard; and we hope for the sake of the unprotected female, into whose professions this Instrument to be disposed of remains, and which she says is the last of her Uncle's productions, that it will also find regard, as a Relic which belonged to a learned and most ingenious Artist.

As the comfortable subsistence of this deserving Female is chiefly depending upon the successful disposal of this Instrument, it is anxiously expected that you will add your name to the List of Subscribers, and the present appeal is made to You Sir individually, as one interested in the advancement of a Science, to which the labours of her Uncle's whole life were exclusively devoted; And we hope the appeal will not be made in vain, as happily for her interest, the circumstances of the case are of such a nature, that a love of Science, and the gratification of benevolence, can at once be indulged.

I am,

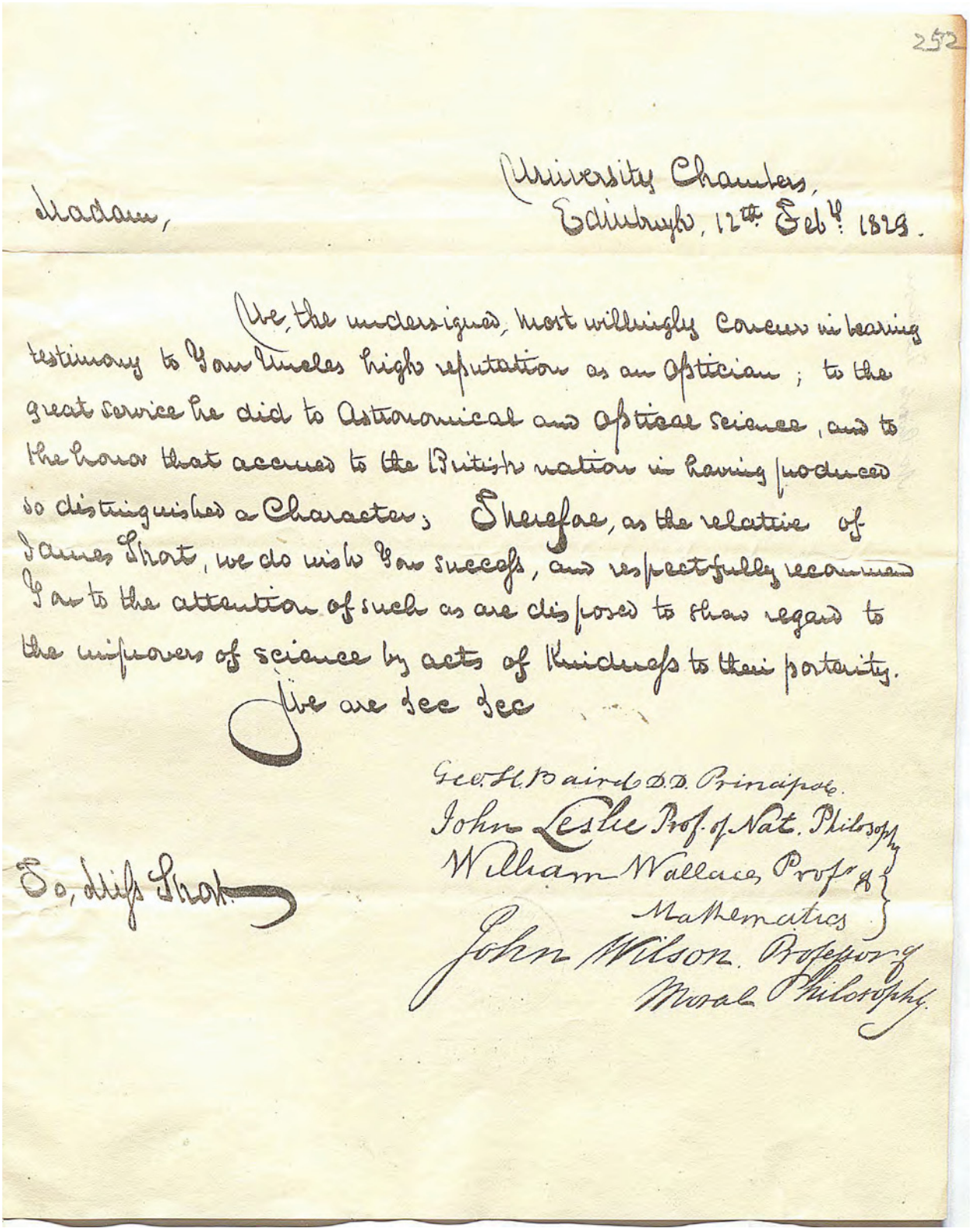
Most respectfully

Sir

Your most obedient Servant,

Jno Fleming

Figure 7c (3 of 4)
Great Telescope letter campaign, 1831 (NLS 15616 / MS 3918 / 65-66)



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University Chambers,
Edinburgh, 12th Feb.y 1829.

Madam,

We, the undersigned, most willingly concur in bearing testimony to Your Uncles high reputation as an Optician; to the great service he did to Astronomical and Optical Science, and to the honor that accrues to the British nation in having produced so distinguished a Character; Therefore, as the relative of James Short, we do wish You success, and respectfully recommend You to the attention of such as are disposed to shew regard to the improvers of science by acts of Kindness to their posterity.

We are &c &c

Geo. Baird D.D. Principal.
John Leslie Prof. of Nat. Philosophy
William Wallace, Prof. of Mathematics
John Wilson. Professor of Moral Philosophy

To, Miss Short

Figure 7d (4 of 4)
Great Telescope letter campaign, 1831 (NLS 15616 / MS 3918 / 65-66)

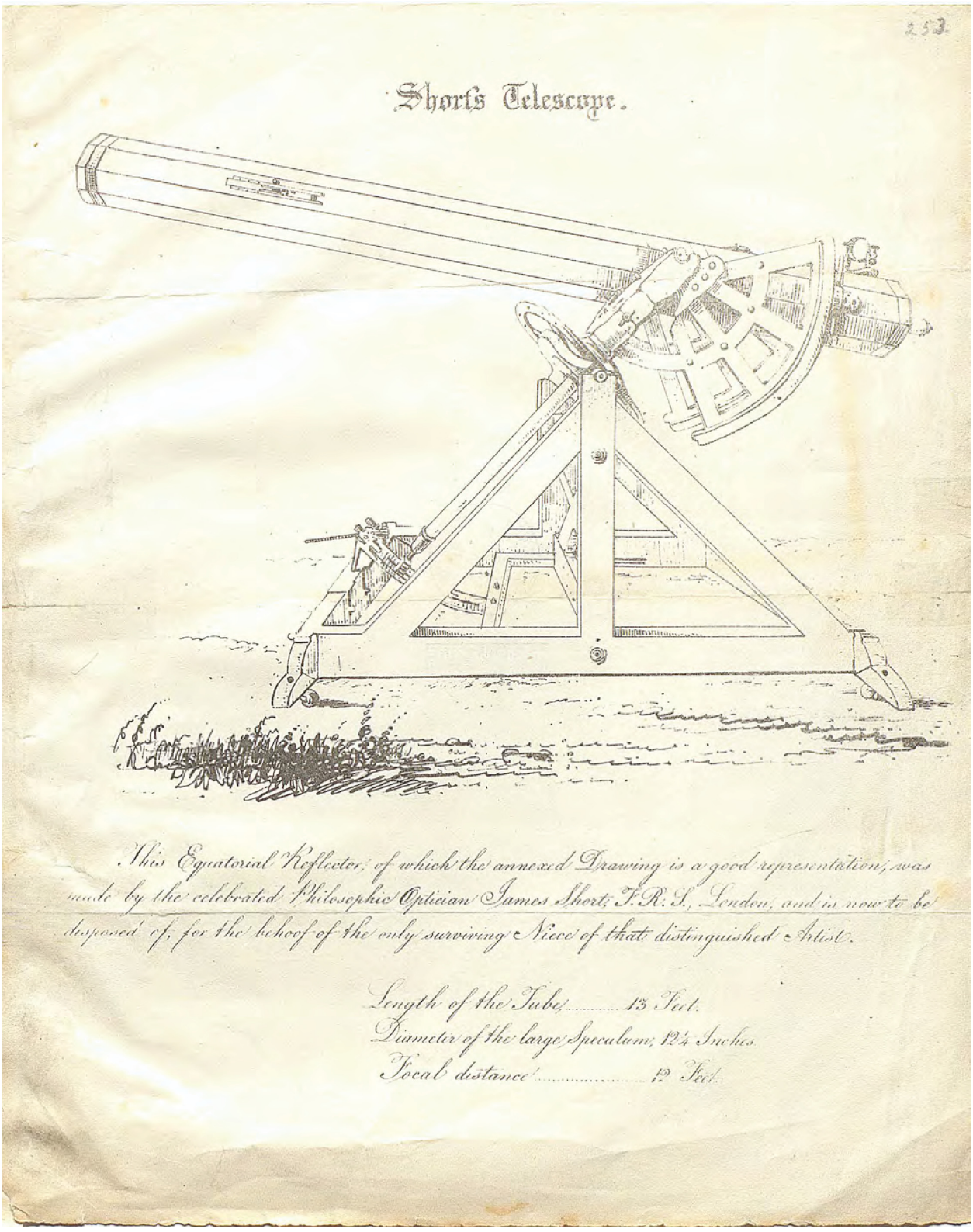
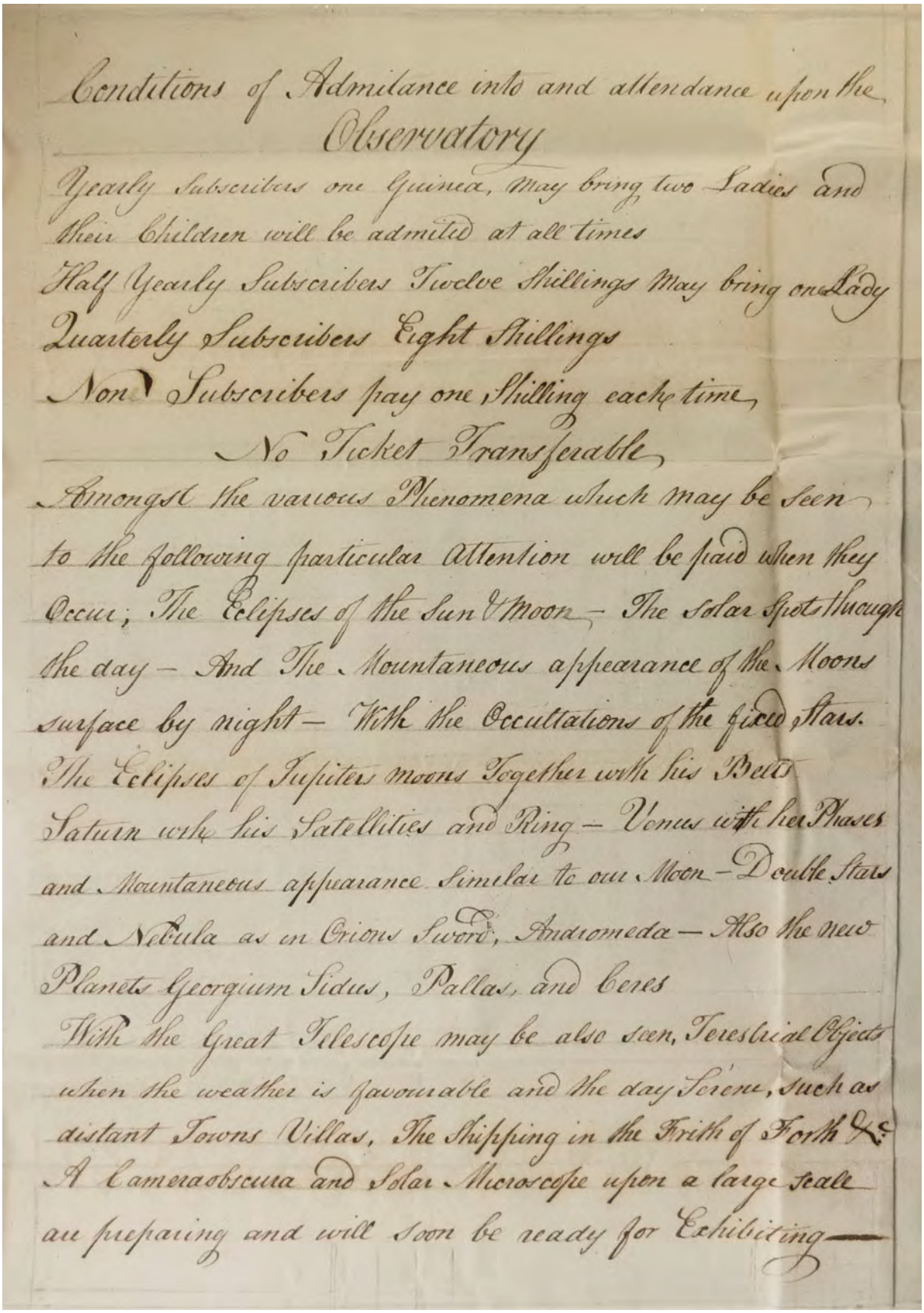


Figure 8
Conditions of Admittance into and attendance upon the Observatory C1834 (ECA D0105R)



Conditions of Admittance into and attendance upon the Observatory

Yearly Subscribers one Guinea, may bring two Ladies and their Children will be admited at all times

Half Yearly Subscribers Twelve Shillings May bring one Lady

Quarterly Subscribers Eight Shillings

Non Subscribers pay one Shilling each time

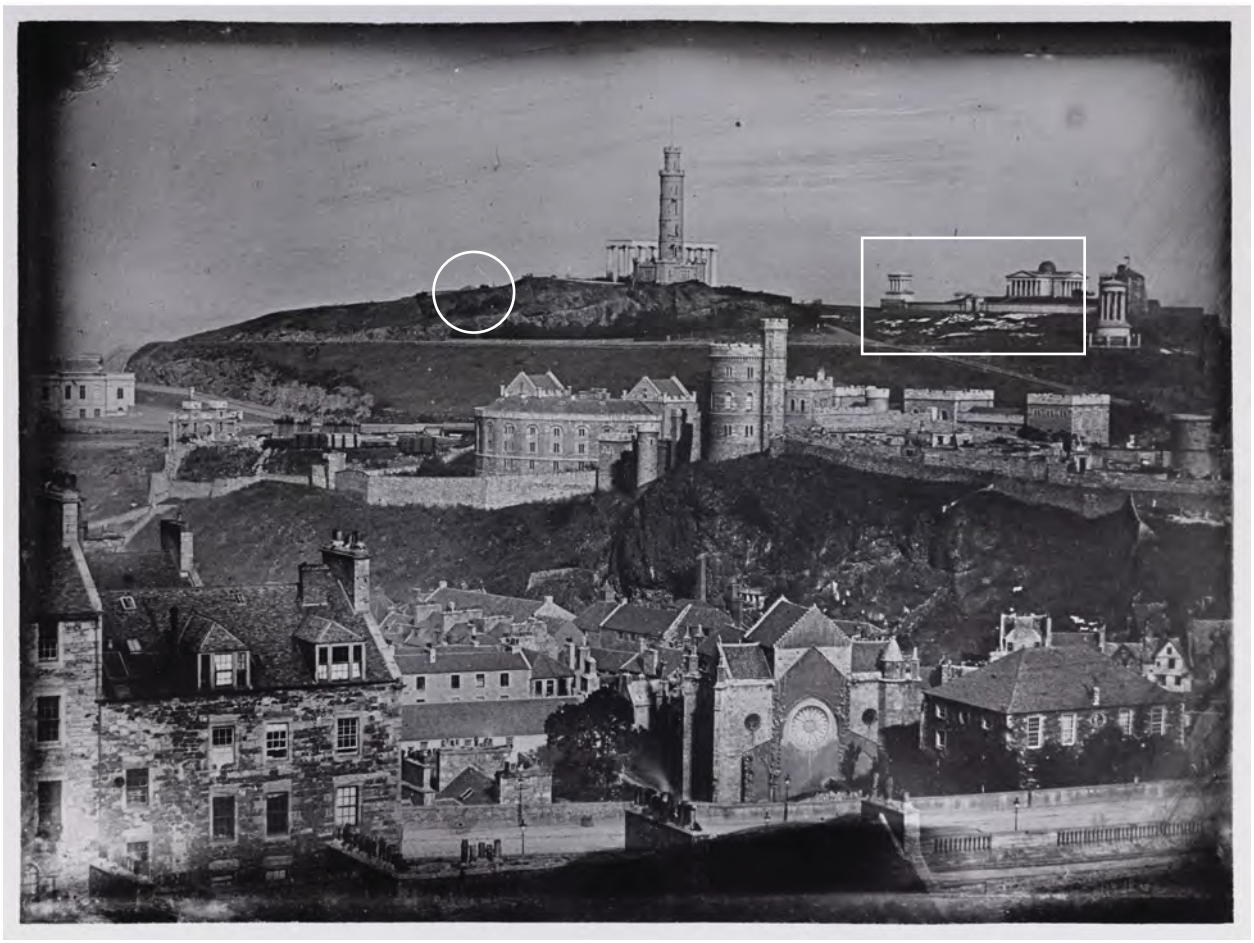
No Ticket Transferable

Amongst the various Phenomena which may be seen to the following particular Attention will be paid when they Occur; The Eclipses of the Sun & Moon – The Solar Spots through the day – And The Mountaneous appearance of the Moons surface by night – With the Occultations of the fixed Stars. The Eclipses of Jupiters moons Together with his Belts Saturn with his Satellities and Ring – Venus with her Phases and Mountaneous appearance Similar to our Moon – Double Stars and Nebula as in Orions Sword, Andromeda – Also the new Planets Georgium Sidus, Pallas, and Ceres

With the Great Telescope may be also seen, Terestrial Objects when the weather is favourable and the day Serene, such as distant Towns Villas, The Shipping in the Frith of Forth &c

A Cameraobscura and Solar Microscope upon a large scale are preparing and will soon be ready for Exhibiting —

Figure 9
(and details)
Calton Hill from the High Street, c1840 daguerreotype, attributed to Thomas Davidson
(National Museums Scotland T.1938.104)



Details show the dome of Short's Observatory (left); and linens being bleached on the ground in front of the Royal Observatory (right). Note that the original daguerreotype (top) is flipped left to right.

Figure 10
(right and detail)
Drawing of Short's Observatory
(J. H. A. Macdonald, *Life Jottings of an Old Edinburgh Citizen*, London:T.N. Foulis, 1915.)

Figure 11
(below and detail)
Robert Buford
A View of the City of Edinburgh and surrounding country, 1843
panorama key
(John Johnson Collection of Printed Ephemera, Oxford)

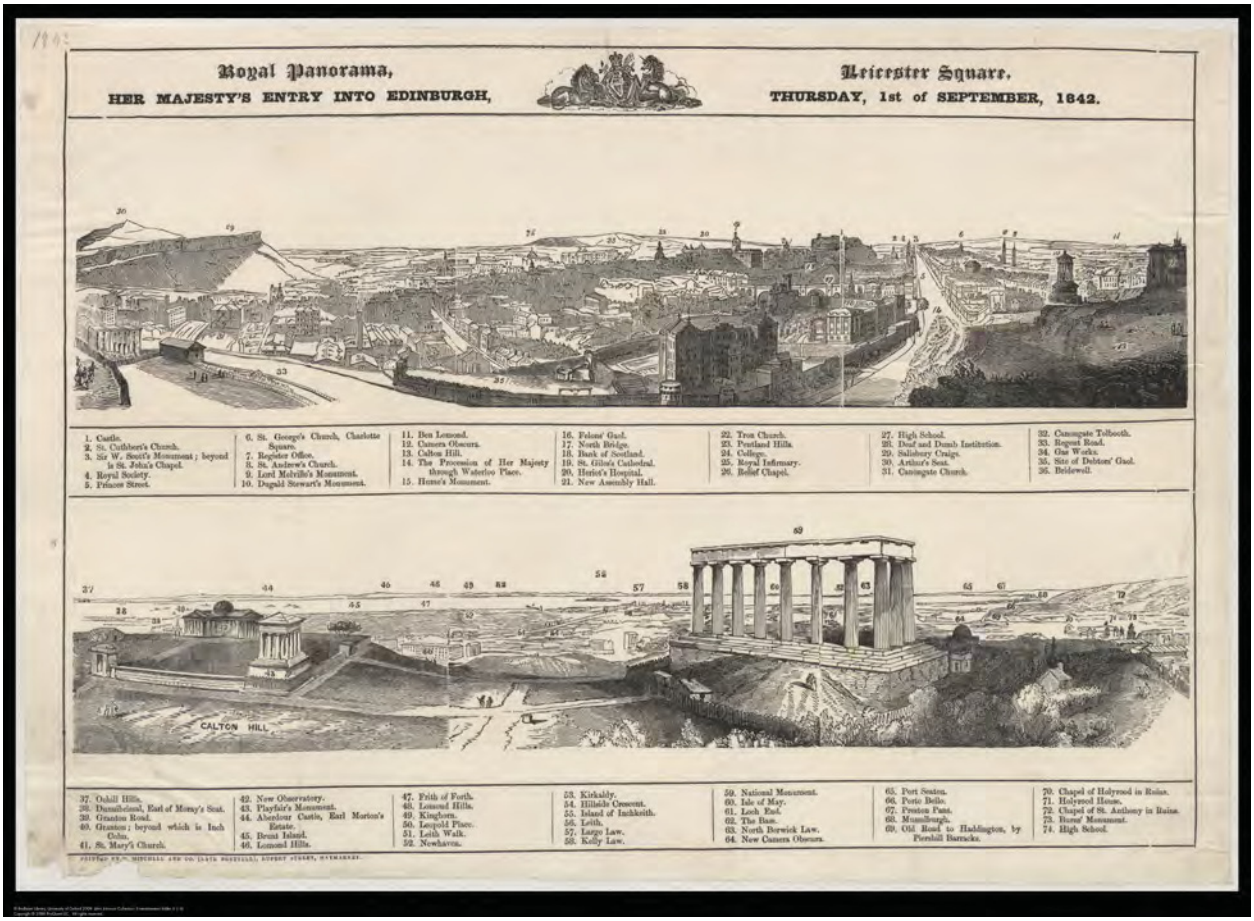
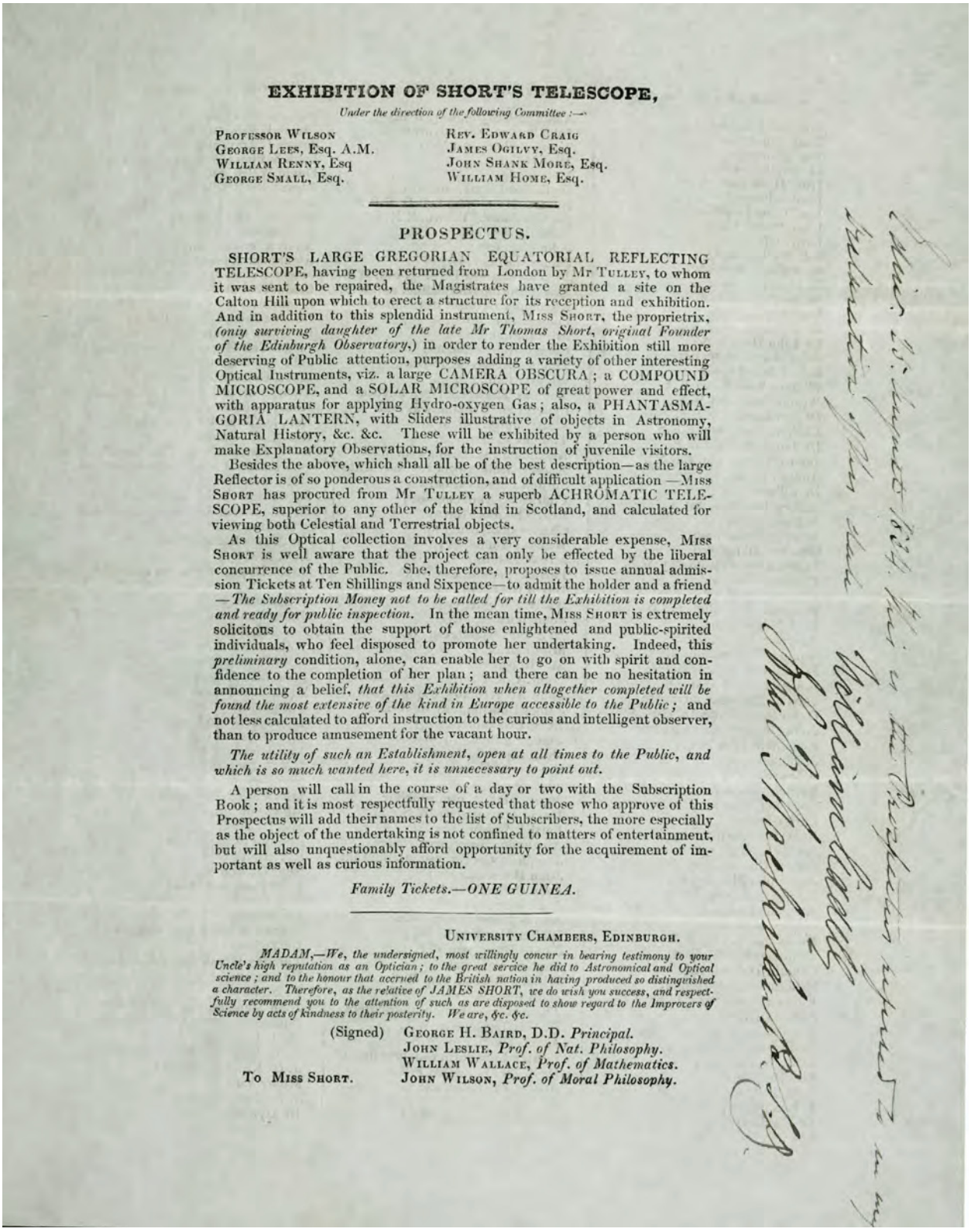


Figure 12a (1 of 2)
Exhibition of Short's Telescope, c1834 (NAS AD 14/35/359)



EXHIBITION OF SHORT'S TELESCOPE,

Under the direction of the following Committee :—

PROFESSOR WILSON
GEORGE LEES, Esq. A.M.
WILLIAM RENNY, Esq
GEORGE SMALL, Esq.
REV. EDWARD CRAIG
JAMES OGILVY, Esq.
JOHN SHANK MORE, Esq.
WILLIAM HOME, Esq.

PROSPECTUS.

SHORT'S LARGE GREGORIAN EQUATORIAL REFLECTING TELESCOPE, having been returned from London by MR TULLEY, to whom it was sent to be repaired, the Magistrates have granted a site on the Calton Hill upon which to erect a structure for its reception and exhibition. And in addition to this splendid instrument, MISS SHORT, the proprietrix, *(only surviving daughter of the late Mr Thomas Short, original Founder of the Edinburgh Observatory,)* in order to render the Exhibition still more deserving of Public attention, purposes adding a variety of other interesting Optical Instruments, viz. a large CAMERA OBSCURA ; a COMPOUND MICROSCOPE, and a SOLAR MICROSCOPE of great power and effect, with apparatus for applying Hydro-oxygen Gas ; also, a PHANTASMAGORIA LANTERN, with Sliders illustrative of objects in Astronomy, Natural History, &c. &c. These will be exhibited by a person who will make Explanatory Observations, for the instruction of juvenile visitors.

Besides the above, which shall all be of the best description—as the large Reflector is of so ponderous a construction, and of difficult application —MISS SHORT has procured from MR TULLEY a superb ACHROMATIC TELESCOPE, superior to any other of the kind in Scotland, and calculated for viewing both Celestial and Terrestrial objects.

As this Optical collection involves a very considerable expense, MISS SHORT is well aware that the project can only be effected by the liberal concurrence of the Public. She, therefore, proposes to issue annual admission Tickets at Ten Shillings and Sixpence—to admit the holder and a friend —*The Subscription Money not to be called for till the Exhibition is completed and ready for public inspection.* In the mean time, MISS SHORT is extremely solicitous to obtain the support of those enlightened and public-spirited individuals, who feel disposed to promote her undertaking. Indeed, this *preliminary* condition, alone, can enable her to go on with spirit and confidence to the completion of her plan ; and there can be no hesitation in announcing a belief, *that this Exhibition when altogether completed will be found the most extensive of the kind in Europe accessible to the Public ;* and not less calculated to afford instruction to the curious and intelligent observer, than to produce amusement for the vacant hour.

The utility of such an Establishment, open at all times to the Public, and which is so much wanted here, it is unnecessary to point out.

A person will call in the course of a day or two with the Subscription Book ; and it is most respectfully requested that those who approve of this Prospectus will add their names to the list of Subscribers, the more especially as the object of the undertaking is not confined to matters of entertainment, but will also unquestionably afford opportunity for the acquirement of important as well as curious information.

Family Tickets.—ONE GUINEA.

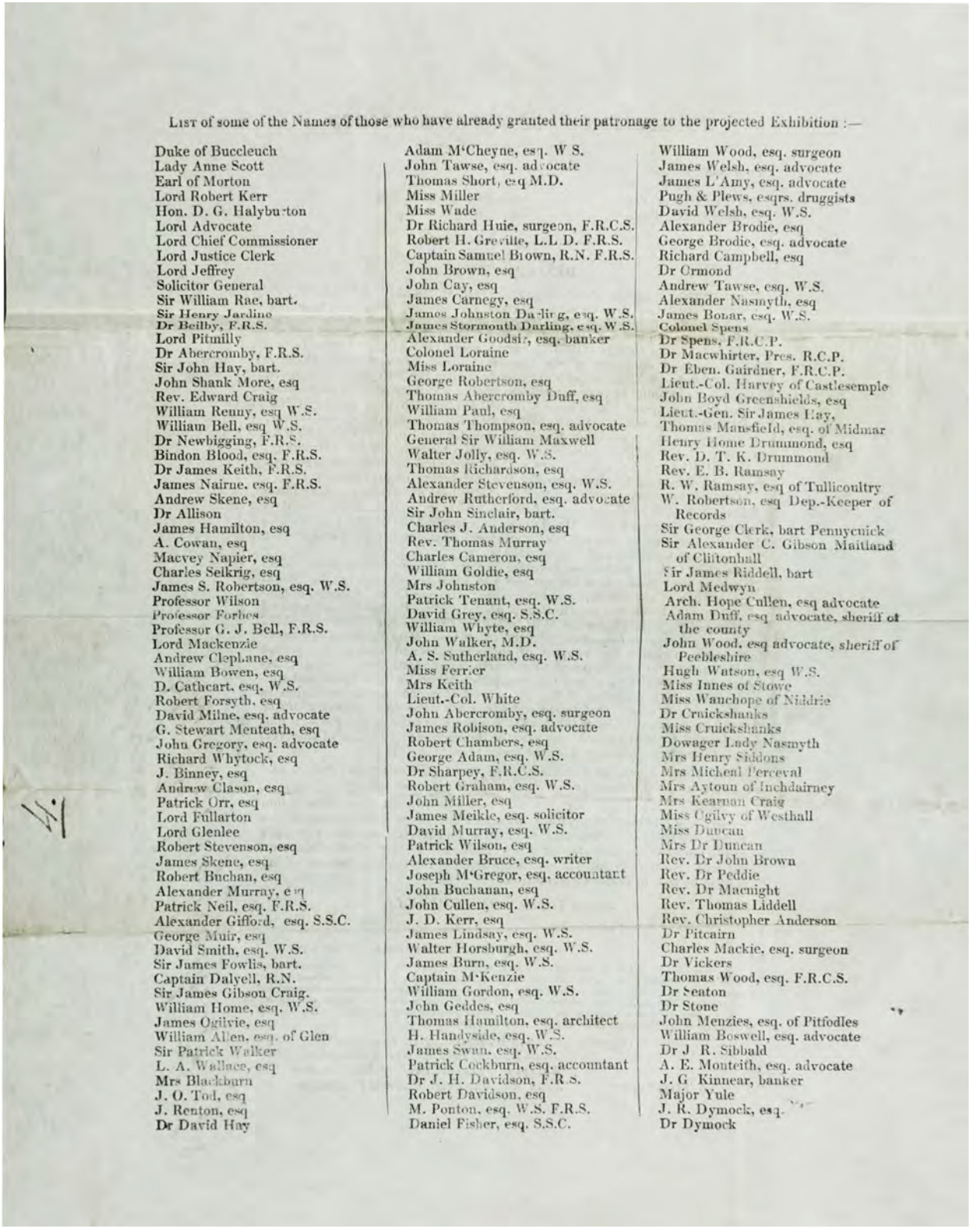
UNIVERSITY CHAMBERS, EDINBURGH.

MADAM,—We, the undersigned, most willingly concur in bearing testimony to your Uncle's high reputation as an Optician ; to the great service he did to Astronomical and Optical science ; and to the honour that accrued to the British nation in having produced so distinguished a character. Therefore, as the relative of JAMES SHORT, we do wish you success, and respectfully recommend you to the attention of such as are disposed to show regard to the Improvers of Science by acts of kindness to their posterity. We are, &c. &c.

(Signed) GEORGE H. BAIRD, D.D. *Principal.*
JOHN LESLIE, *Prof. of Nat. Philosophy.*
WILLIAM WALLACE, *Prof. of Mathematics.*
JOHN WILSON, *Prof. of Moral Philosophy.*

To MISS SHORT.

Figure 12b (2 of 2)
Exhibition of Short's Telescope, c1834. (NAS AD 14/35/359)



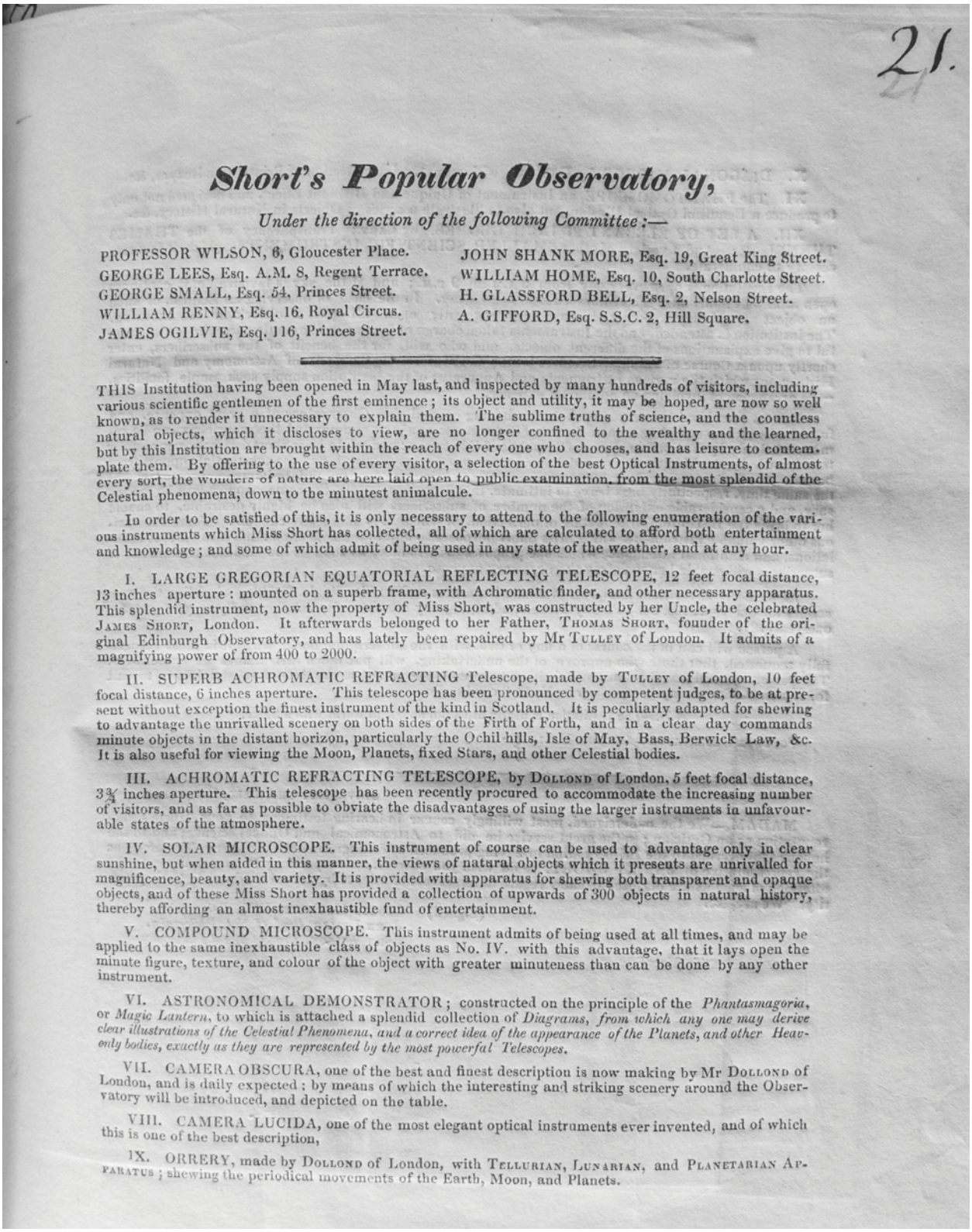
List of some of the Names of those who have already granted their patronage to the projected Exhibition :—

Duke of Buccleuch
Lady Anne Scott
Earl of Morton
Lord Robert Kerr
Hon. D. G. Halyburton
Lord Advocate
Lord Chief Commissioner
Lord Justice Clerk
Lord Jeffrey
Solicitor General
Sir William Rae, bart.
Sir Henry Jardine
Dr Beilby, F.R.S.
Lord Pitmilly
Dr Abercromby, F.R.S.
Sir John Hay, bart.
John Shank More, esq
Rev. Edward Craig
William Renny, esq W.S.
William Bell, esq W.S.
Dr Newbigging, F.R.S.
Bindon Blood, esq. F.R.S.
Dr James Keith, F.R.S.
James Nairne, esq. F.R.S.
Andrew Skene, esq
Dr Allison
James Hamilton, esq
A. Cowan, esq
Macvey Napier, esq
Charles Selkrig, esq
James S. Robertson, esq. W.S.
Professor Wilson
Professor Forbes
Professor G. J. Bell, F.R.S.
Lord Mackenzie
Andrew Clephane, esq
William Bowen, esq
D. Cathcart, esq. W.S.
Robert Forsyth, esq
David Milne, esq. advocate
G. Stewart Menteath, esq
John Gregory, esq. advocate
Richard Whytock, esq
J. Binney, esq
Andrew Clason, esq
Patrick Orr, esq
Lord Fullarton
Lord Glenlee
Robert Stevenson, esq
James Skene, esq
Robert Buchan, esq
Alexander Murray, esq
Patrick Neil, esq. F.R.S.
Alexander Gifford, esq. S.S.C.
George Muir, esq
David Smith, esq. W.S.
Sir James Fowlis, bart.
Captain Dalyell, R.N.
Sir James Gibson Craig.
William Home, esq. W.S.
James Ogilvie, esq
William Allen, esq. of Glen
Sir Patrick Walker
L. A. Wallace, esq
Mrs Blackburn
J. O. Tod, esq
J. Renton, esq
Dr David Hay

Adam M'Cheyne, esq. W.S.
John Tawse, esq. advocate
Thomas Short, esq M.D.
Miss Miller
Miss Wade
Dr Richard Huie, surgeon, F.R.C.S.
Robert H. Greville, L.L.D. F.R.S.
Captain Samuel Brown, R.N. F.R.S.
John Brown, esq
John Cay, esq
James Carnegy, esq
James Johnston Darling, esq. W.S.
James Stormonth Darling, esq. W.S.
Alexander Goodsir, esq. banker
Colonel Loraine
Miss Loraine
George Robertson, esq
Thomas Abercromby Duff, esq
William Paul, esq
Thomas Thompson, esq. advocate
General Sir William Maxwell
Walter Jolly, esq. W.S.
Thomas Richardson, esq
Alexander Stevenson, esq. W.S.
Andrew Rutherford, esq. advocate
Sir John Sinclair, bart.
Charles J. Anderson, esq
Rev. Thomas Murray
Charles Cameron, esq
William Goldie, esq
Mrs Johnston
Patrick Tenant, esq. W.S.
David Grey, esq. S.S.C.
William Whyte, esq
John Walker, M.D.
A. S. Sutherland, esq. W.S.
Miss Ferrier
Mrs Keith
Lieut.-Col. White
John Abercromby, esq. surgeon
James Robison, esq. advocate
Robert Chambers, esq
George Adam, esq. W.S.
Dr Sharpey, F.R.C.S.
Robert Graham, esq. W.S.
John Miller, esq
James Meikle, esq. solicitor
David Murray, esq. W.S.
Patrick Wilson, esq
Alexander Bruce, esq. writer
Joseph M'Gregor, esq. accountant
John Buchanan, esq
John Cullen, esq. W.S.
J. D. Kerr, esq
James Lindsay, esq. W.S.
Walter Horsburgh, esq. W.S.
James Burn, esq. W.S.
Captain M'Kenzie
William Gordon, esq. W.S.
John Geddes, esq
Thomas Hamilton, esq. architect
H. Handyside, esq. W.S.
James Swan, esq. W.S.
Patrick Cockburn, esq. accountant
Dr J. H. Davidson, F.R.S.
Robert Davidson, esq
M. Ponton, esq. W.S. F.R.S.
Daniel Fisher, esq. S.S.C.

William Wood, esq. surgeon
James Welsh, esq. advocate
James L'Amy, esq. advocate
Pugh & Plews, esqrs. druggists
David Welsh, esq. W.S.
Alexander Brodie, esq
George Brodie, esq. advocate
Richard Campbell, esq
Dr Ormond
Andrew Tawse, esq. W.S.
Alexander Nasmyth, esq
James Bonar, esq. W.S.
Colonel Spens
Dr Spens, F.R.C.P.
Dr Macwhirter, Pres. R.C.P.
Dr Eben. Gairdner, F.R.C.P.
Lieut.-Col. Harvey of Castlesemple
John Boyd Greenshields, esq
Lieut.-Gen. Sir James Hay,
Thomas Mansfield, esq. of Midmar
Henry Home Drummond, esq
Rev. D. T. K. Drummond
Rev. E. B. Ramsay
R. W. Ramsay, esq of Tullicoultry
W. Robertson, esq Dep.-Keeper of Records
Sir George Clerk, bart Pennycuick
Sir Alexander C. Gibson Maitland of Cliftonhall
Sir James Riddell, bart
Lord Medwyn
Arch. Hope Cullen, esq advocate
Adam Duff, esq advocate, sheriff of the county
John Wood, esq advocate, sheriff of Peebleshire
Hugh Watson, esq W.S.
Miss Innes of Stowe
Miss Wauchope of Niddrie
Dr Cruickshanks
Miss Cruickshanks
Dowager Lady Nasmyth
Mrs Henry Siddons
Mrs Michael Perceval
Mrs Aytoun of Inchdairney
Mrs Kearnan Craig
Miss Ogilvy of Westhall
Miss Duncan
Mrs Dr Duncan
Rev. Dr John Brown
Rev. Dr Peddie
Rev. Dr Macnight
Rev. Thomas Liddell
Rev. Christopher Anderson
Dr Pitcairn
Charles Mackie, esq. surgeon
Dr Vickers
Thomas Wood, esq. F.R.C.S.
Dr Seaton
Dr Stone
John Menzies, esq. of Pitfodles
William Boswell, esq. advocate
Dr J. R. Sibbald
A. E. Monteith, esq. advocate
J. G. Kinnear, banker
Major Yule
J. R. Dymock, esq.
Dr Dymock

Figure 13a (1 of 3)
Short's Popular Observatory, c1836 (EU ATT.80 P2/21)



21.

Short's Popular Observatory,

Under the direction of the following Committee:—

PROFESSOR WILSON, 6, Gloucester Place.
GEORGE LEES, Esq. A.M. 8, Regent Terrace.
GEORGE SMALL, Esq. 54, Princes Street.
WILLIAM RENNY, Esq. 16, Royal Circus.
JAMES OGILVIE, Esq. 116, Princes Street.
JOHN SHANK MORE, Esq. 19, Great King Street.
WILLIAM HOME, Esq. 10, South Charlotte Street.
H. GLASSFORD BELL, Esq. 2, Nelson Street.
A. GIFFORD, Esq. S.S.C. 2, Hill Square.

THIS Institution having been opened in May last, and inspected by many hundreds of visitors, including various scientific gentlemen of the first eminence; its object and utility, it may be hoped, are now so well known, as to render it unnecessary to explain them. The sublime truths of science, and the countless natural objects, which it discloses to view, are no longer confined to the wealthy and the learned, but by this Institution are brought within the reach of every one who chooses, and has leisure to contemplate them. By offering to the use of every visitor, a selection of the best Optical Instruments, of almost every sort, the wonders of nature are here laid open to public examination, from the most splendid of the Celestial phenomena, down to the minutest animalcule.

In order to be satisfied of this, it is only necessary to attend to the following enumeration of the various instruments which Miss Short has collected, all of which are calculated to afford both entertainment and knowledge; and some of which admit of being used in any state of the weather, and at any hour.

I. LARGE GREGORIAN EQUATORIAL REFLECTING TELESCOPE, 12 feet focal distance, 13 inches aperture: mounted on a superb frame, with Achromatic finder, and other necessary apparatus. This splendid instrument, now the property of Miss Short, was constructed by her Uncle, the celebrated JAMES SHORT, London. It afterwards belonged to her Father, THOMAS SHORT, founder of the original Edinburgh Observatory, and has lately been repaired by Mr TULLEY of London. It admits of a magnifying power of from 400 to 2000.

II. SUPERB ACHROMATIC REFRACTING Telescope, made by TULLEY of London, 10 feet focal distance, 6 inches aperture. This telescope has been pronounced by competent judges, to be at present without exception the finest instrument of the kind in Scotland. It is peculiarly adapted for shewing to advantage the unrivalled scenery on both sides of the Firth of Forth, and in a clear day commands minute objects in the distant horizon, particularly the Ochil hills, Isle of May, Bass, Berwick Law, &c. It is also useful for viewing the Moon, Planets, fixed Stars, and other Celestial bodies.

III. ACHROMATIC REFRACTING TELESCOPE, by DOLLOND of London, 5 feet focal distance, 3¾ inches aperture. This telescope has been recently procured to accommodate the increasing number of visitors, and as far as possible to obviate the disadvantages of using the larger instruments in unfavourable states of the atmosphere.

IV. SOLAR MICROSCOPE. This instrument of course can be used to advantage only in clear sunshine, but when aided in this manner, the views of natural objects which it presents are unrivalled for magnificence, beauty, and variety. It is provided with apparatus for shewing both transparent and opaque objects, and of these Miss Short has provided a collection of upwards of 300 objects in natural history, thereby affording an almost inexhaustible fund of entertainment.

V. COMPOUND MICROSCOPE. This instrument admits of being used at all times, and may be applied to the same inexhaustible class of objects as No. IV. with this advantage, that it lays open the minute figure, texture, and colour of the object with greater minuteness than can be done by any other instrument.

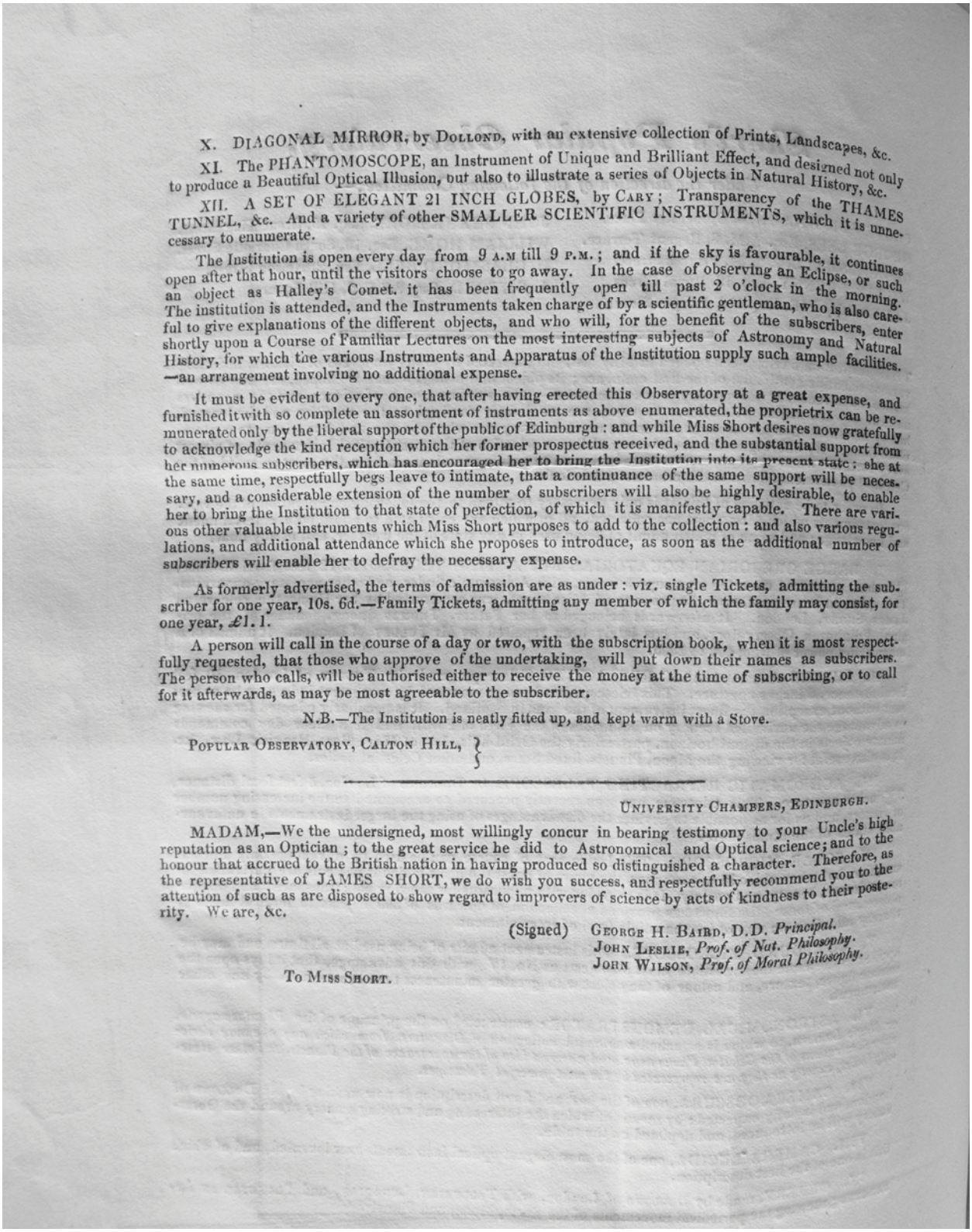
VI. ASTRONOMICAL DEMONSTRATOR; constructed on the principle of the *Phantasmagoria*, or *Magic Lantern*, to which is attached a splendid collection of *Diagrams, from which any one may derive clear illustrations of the Celestial Phenomena, and a correct idea of the appearance of the Planets, and other Heavenly bodies, exactly as they are represented by the most powerful Telescopes.*

VII. CAMERA OBSCURA, one of the best and finest description is now making by Mr DOLLOND of London, and is daily expected; by means of which the interesting and striking scenery around the Observatory will be introduced, and depicted on the table.

VIII. CAMERA LUCIDA, one of the most elegant optical instruments ever invented, and of which this is one of the best description,

IX. ORRERY, made by DOLLOND of London, with TELLURIAN, LUNARIAN, and PLANETARIAN APPARATUS; shewing the periodical movements of the Earth, Moon, and Planets.

Figure 13b (2 of 3)
Short's Popular Observatory, c1836 (EU ATT.80 P2/21)



X. DIAGONAL MIRROR, by DOLLOND, with an extensive collection of Prints, Landscapes, &c.

XI. The PHANTOMOSCOPE, an Instrument of Unique and Brilliant Effect, and designed not only to produce a Beautiful Optical Illusion, but also to illustrate a series of Objects in Natural History, &c.

XII. A SET OF ELEGANT 21 INCH GLOBES, by CARY; Transparency of the THAMES TUNNEL, &c. And a variety of other SMALLER SCIENTIFIC INSTRUMENTS, which it is unnecessary to enumerate.

The Institution is open every day from 9 A.M till 9 P.M.; and if the sky is favourable, it continues open after that hour, until the visitors choose to go away. In the case of observing an Eclipse, or such an object as Halley's Comet. it has been frequently open till past 2 o'clock in the morning. The institution is attended, and the Instruments taken charge of by a scientific gentleman, who is also careful to give explanations of the different objects, and who will, for the benefit of the subscribers, enter shortly upon a Course of Familiar Lectures on the most interesting subjects of Astronomy and Natural History, for which the various Instruments and Apparatus of the Institution supply such ample facilities. —an arrangement involving no additional expense.

It must be evident to every one, that after having erected this Observatory at a great expense, and furnished it with so complete an assortment of instruments as above enumerated, the proprietrix can be remunerated only by the liberal support of the public of Edinburgh: and while Miss Short desires now gratefully to acknowledge the kind reception which her former prospectus received, and the substantial support from her numerous subscribers, which has encouraged her to bring the Institution into its present state: she at the same time, respectfully begs leave to intimate, that a continuance of the same support will be necessary, and a considerable extension of the number of subscribers will also be highly desirable, to enable her to bring the Institution to that state of perfection, of which it is manifestly capable. There are various other valuable instruments which Miss Short purposes to add to the collection: and also various regulations, and additional attendance which she proposes to introduce, as soon as the additional number of subscribers will enable her to defray the necessary expense.

As formerly advertised, the terms of admission are as under: viz. single Tickets, admitting the subscriber for one year, 10s. 6d.—Family Tickets, admitting any member of which the family may consist, for one year, £1. 1.

A person will call in the course of a day or two, with the subscription book, when it is most respectfully requested, that those who approve of the undertaking, will put down their names as subscribers. The person who calls, will be authorised either to receive the money at the time of subscribing, or to call for it afterwards, as may be most agreeable to the subscriber.

N.B.—The Institution is neatly fitted up, and kept warm with a Stove.

POPULAR OBSERVATORY, CALTON HILL, }

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MADAM,—We the undersigned, most willingly concur in bearing testimony to your Uncle's high reputation as an Optician; to the great service he did to Astronomical and Optical science; and to the honour that accrued to the British nation in having produced so distinguished a character. Therefore, as the representative of JAMES SHORT, we do wish you success, and respectfully recommend you to the attention of such as are disposed to show regard to improvers of science by acts of kindness to their posterity. We are, &c.

(Signed) GEORGE H. BAIRD, D.D. *Principal.*
JOHN LESLIE, *Prof. of Nat. Philosophy.*
JOHN WILSON, *Prof. of Moral Philosophy.*

To MISS SHORT.

Figure 13c (3 of 3)
Short's Popular Observatory, c1836 (EU ATT.80 P2/21)

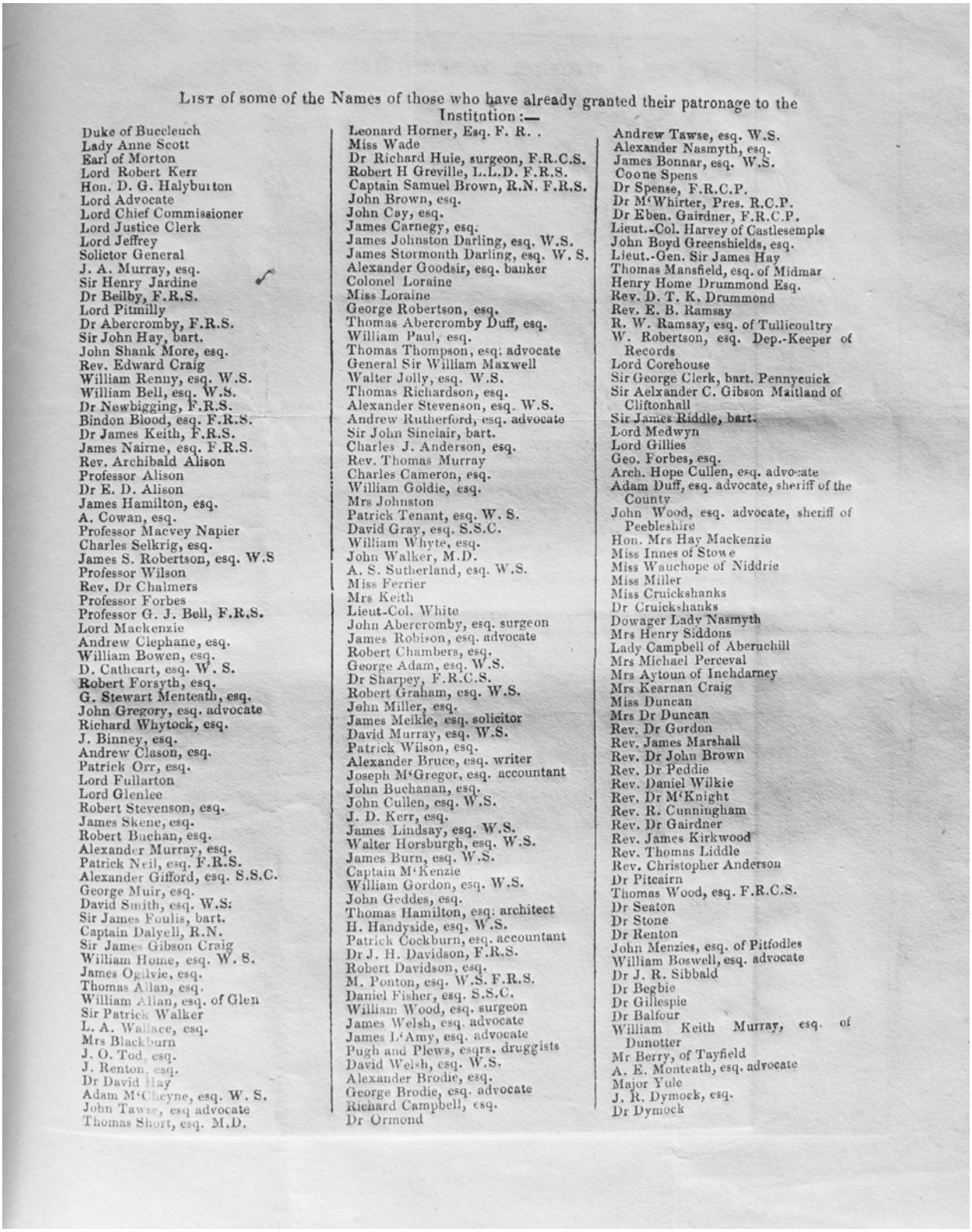

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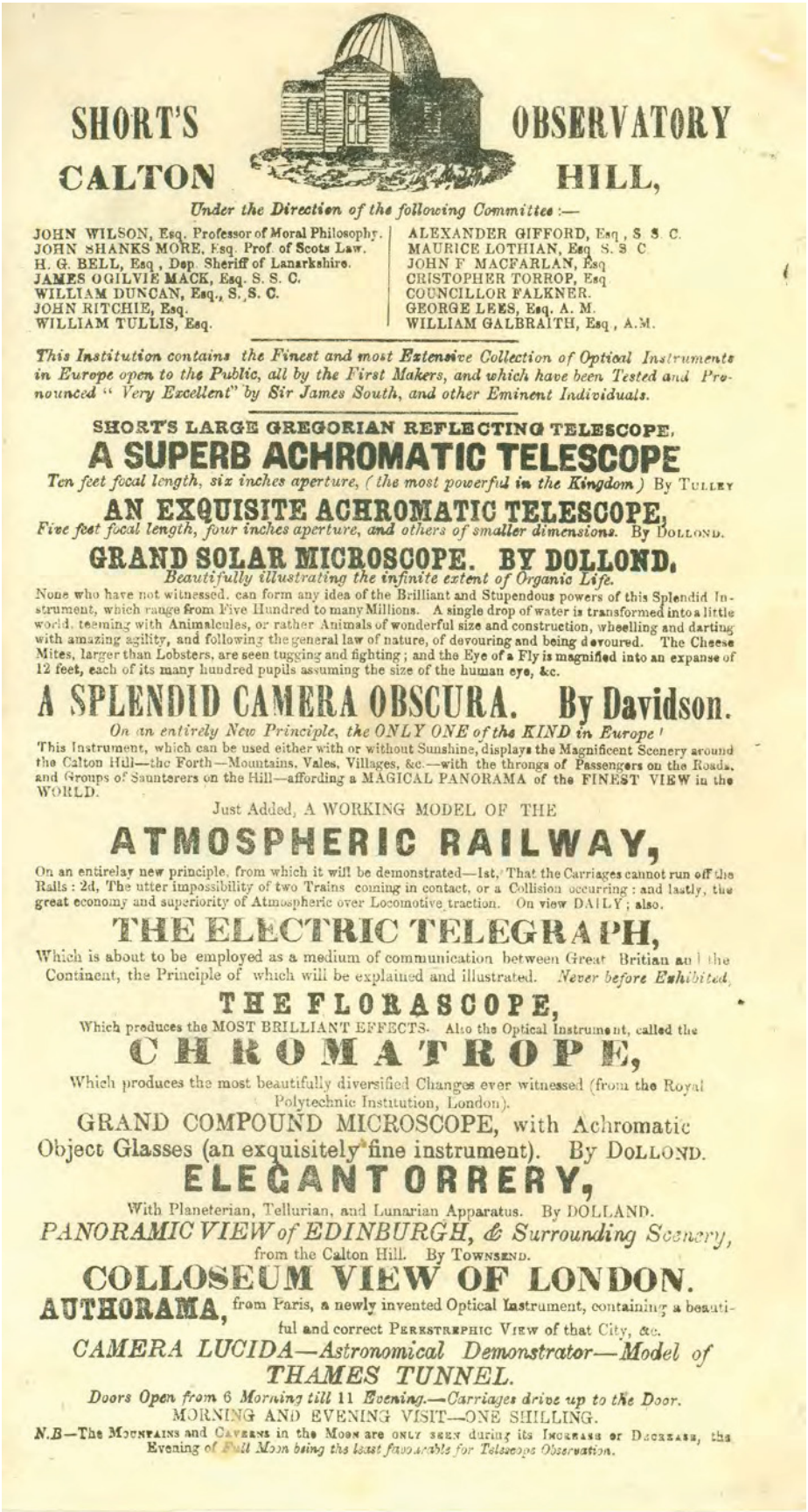
Figure 14
Short's Observatory Handbill, c1840s (BD EXEBD 12785)



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A SUPERB ACHROMATIC TELESCOPE

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Five feet focal length, four inches aperture, and others of smaller dimensions. By DOLLOND.

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Beautifully illustrating the infinite extent of Organic Life.

None who have not witnessed, can form any idea of the Brilliant and Stupendous powers of this Splendid Instrument, which range from Five Hundred to many Millions. A single drop of water is transformed into a little world, teeming with Animalcules, or rather Animals of wonderful size and construction, wheelling and darting with amazing agility, and following the general law of nature, of devouring and being devoured. The Cheese Mites, larger than Lobsters, are seen tugging and fighting; and the Eye of a Fly is magnified into an expanse of 12 feet, each of its many hundred pupils assuming the size of the human eye, &c.

A SPLENDID CAMERA OBSCURA. By Davidson.

On an entirely New Principle, the ONLY ONE of the KIND in Europe!

This Instrument, which can be used either with or without Sunshine, displays the Magnificent Scenery around the Calton Hill—the Forth—Mountains, Vales, Villages, &c.—with the throngs of Passengers on the Roads, and Groups of Sauntorers on the Hill—affording a MAGICAL PANORAMA of the FINEST VIEW in the WORLD.

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MORNING AND EVENING VISIT—ONE SHILLING.

N.B—The MOUNTAINS and CAVERNS in the MOON are ONLY SEEN during its INCREASE or DECREASE, the Evening of *Full Moon being the least favourable for Telescope Observation.*

Figure 15
Short's Observatory
on Castlehill, c1870
(image courtesy of
Edinburgh's Camera Obscura
and World of Illusions)

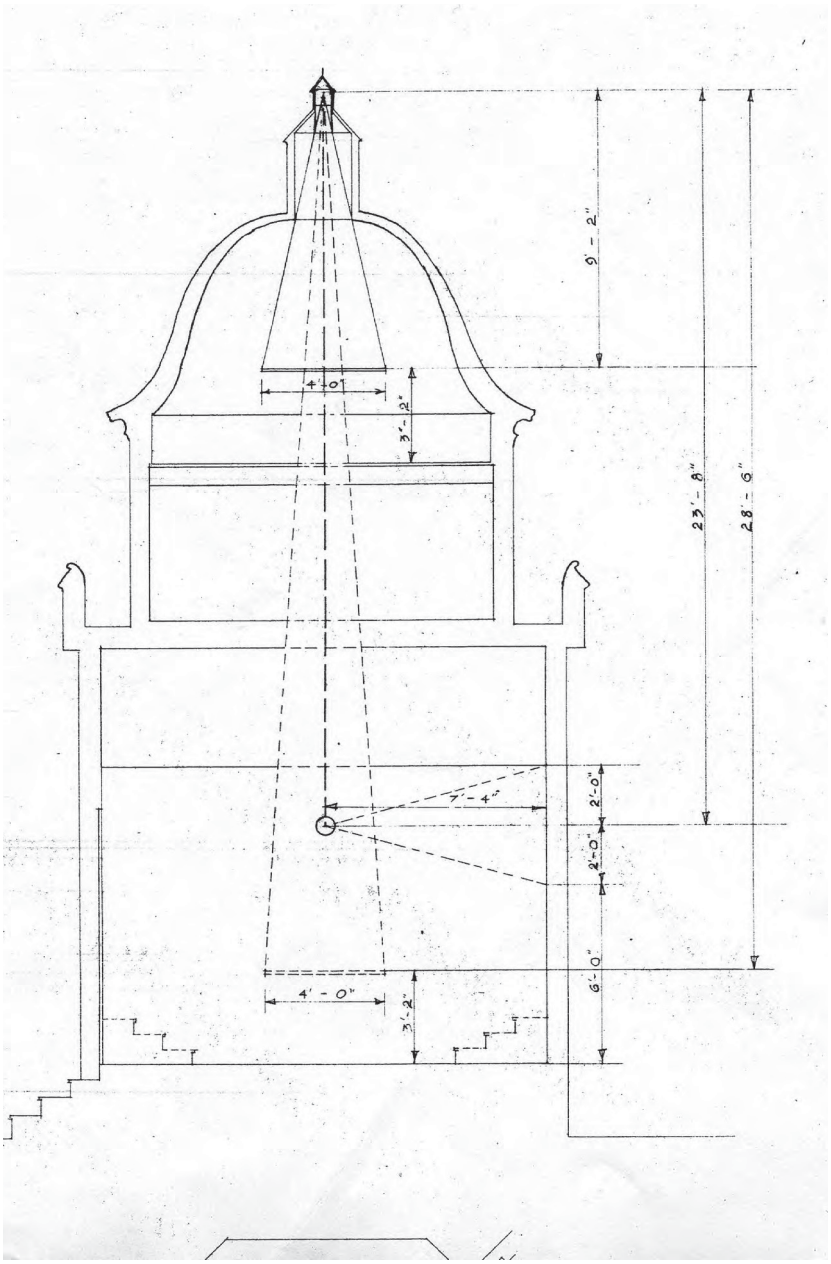

Figure 16
Antony Wolffe, Diagram
showing the
Castlehill camera obscura
specifications, before and
after the 1847 renovation
(copy given by Mr. Wolffe to
the author, deposited at the
CCA in the Outlook Tower/
Patrick Geddes vertical file)

Figure 17
(right) Cover Illustration, c1880
(*The Illustrated Police News*,
Jack & Beverley Wilgus collection)

Figure 18
(below) Interior of the New York
Central Park camera obscura, 1877
(*Frank Leslie's Popular Monthly*,
Jack & Beverley Wilgus collection)

Figures 19a & 19b (detail below), *At the Beach* (*Puck Magazine*, August 30. 1890, Jack & Beverley Wilgus collection)

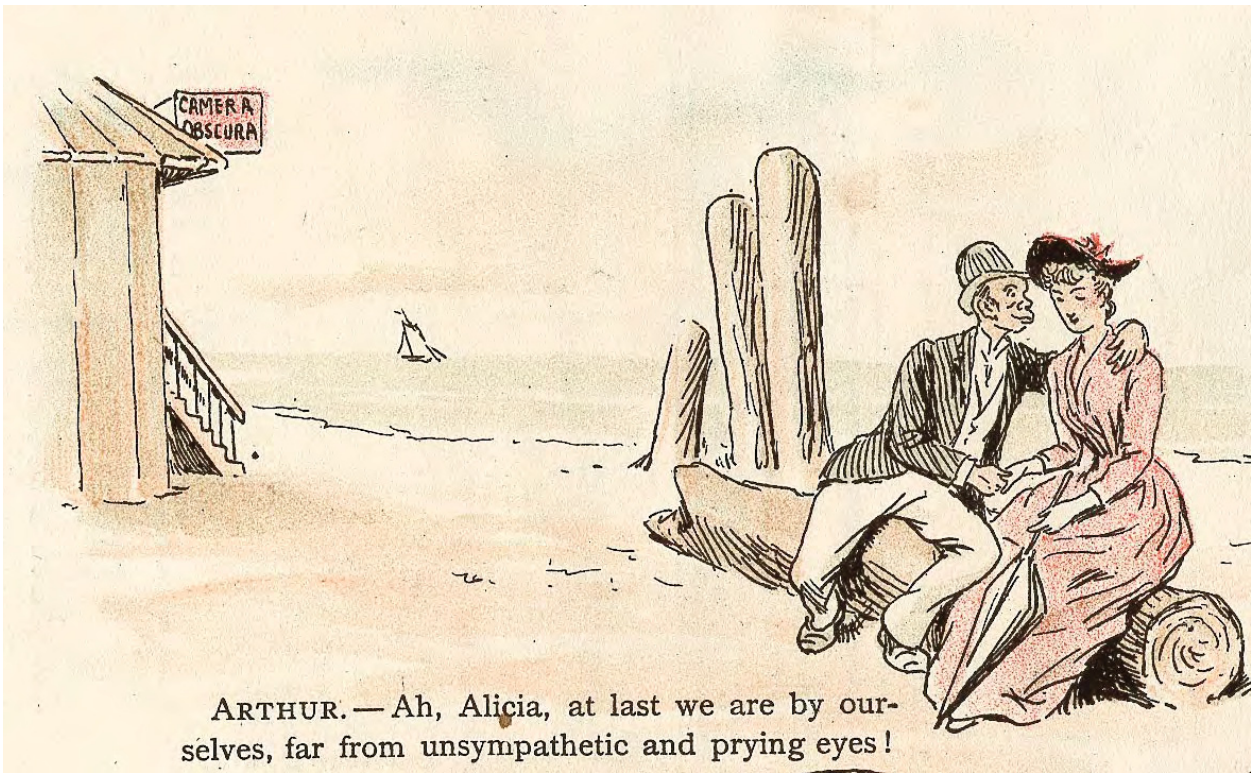

Figure 20
(right)
M. Egerton,
Washer women on the Calton Hill.
(*Airy nothings, or, Scraps and naughts*, London: Pyall and Hunt, 1825).

Figure 21
(lower right)
Isaac Cruikshank
Scotch Washing, 1810.
(British Museum
1935,0522.7.22).

Figure 22
Joseph Mallord William Turner, *Edinburgh from Calton Hill*, c1819,
(National Galleries Scotland, D 5446)

Figure 23
(below) Mary Stewart (Lady Elton), *View from the top of Calton Hill, looking to the north*
(*The city of Edinburgh taken from the Calton Hill - four panoramic views of Edinburgh*.
Edinburgh: William Fairborn, 1823)

Thomas Keith, Edinburgh, 1854-1857
Salted paper prints from waxed-paper negatives (calotypes, CCA Collection)

Figure 24 (right) *The Lawnmarket*
(extracted detail: Short's Observatory on Castlehill)

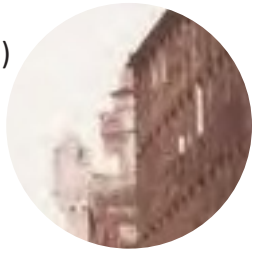

Figure 25 (centre right)
The Westbow

Figure 26 (bottom right)
The Grassmarket

[note: the white "flags" hanging from the buildings are residents' laundry]

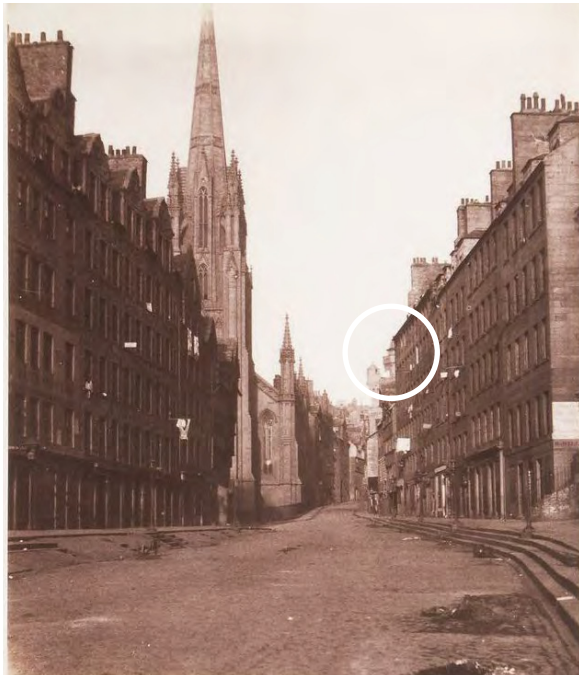

Figure 27 (below)
Archibald Burns
Timber Fronted House, Cowgate
(*Picturesque "bits" from Old Edinburgh,*
Edinburgh: Edmonston & Douglas, 1868)

Figure 28
(right and detail)
John Slezer
The Prospect of ye Town of Dundee from ye East
(*Theatrum Scotiae*, London: John Leake, 1693).

Figure 29
(below)
Thomas Begbie,
Looking west, bleaching and drying laundry
[Calton Hill, Observatory House], c1860.
(Edinburgh City Art Centre, T. BEGBIE 348)

Bibliography

Archives

BD Bill Douglas Museum, University of Exeter
BL British Library
CCA Canadian Centre for Architecture
CU Cambridge University Library
Papers of George Airy (Manuscripts and University Archives)
DM Dumfries Museum Archives
ECA Edinburgh City Archives
Town Council Minutes, Macleod Collection, Downie Criminal Trial, etc.
ECL Edinburgh City Library
Edinburgh and Scottish Collection
EU Edinburgh University Library
Rare Books & Manuscripts, Archives
HU Harvard University
MU McGill University
Rare Books and Special Collections
NAS National Archives of Scotland, National Registry House (Edinburgh)
Burgh Sasines, Court of Sessions Papers, ScotlandsPeople, etc.
NLS National Library of Scotland
Rare Books and Manuscripts
NMM National Media Museum, Bradford
John Hammond Papers
ROE Royal Observatory of Edinburgh Archives
RPI Westminster University, London
Royal Polytechnic Institute Papers
SU University of Strathclyde archives
Patrick Geddes Papers
WM Whipple Museum and Library, Cambridge

Online Newspaper Archives

British Newspaper Archive (britishnewspaperarchive.co.uk)
Titles include*: The Caledonian Mercury, Scots Magazine, etc.*

Scotsman Digital Archive

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Appendix A. Letter from Elizabeth Beverly to Town Council, 1793

Extracted from "Act of Council, Fixing fees to be paid by students for access to Observatory," 4 Dec 1793, ECA D0105R, Copy 9.

Unto the Right Hon'ble The Lord Provost, Bailies and Council of the City of Edinburgh
The Memorial and Representation of Elizabeth Beverly,
Spouse of James Douglas, Grandson of the deceased Thomas Short, optician in Edinburgh

Humbly Sheweth that upon the decease of the said Thomas short in Spring [seventeen?] eighty eight his Widow carried off the Speculum and most of the other moveable apparatus belonging to the Great Equatorial Telescope to the extent of several hundred pounds Sterling value, and having secreted the same in different places about the City the Memorialist's husband (who succeeded to Mr. Short in the Observatory was under the necessity of applying to the Sherriff for warrants against her and her accomplices and in executing the same, and recovering these valuable Instruments he expended the sum of Twenty one pounds four shillings and ten pence conform [?] to Accounts produced. That at this time the small Turret which then contained the Great Telescope was in total disrepair, and unfit to preserve the Instruments from being damaged by the weather as well as unfit for the purpose of using them so that in repairing the same he expending upwards of thirty pounds Sterling conform [?] to documents produced, being two retired Billes No 1 and 2. These facts being well known and the expenditure being indispensibly necessary in order to prevent a much greater loss and damage to the City it will occur to the Honble Magistrates and Council that Mr Douglas ought to be indemnified[?] of these debters[?] [?]– That by an Agreement between the Good Town and Mr Douglas the Observatory for holding and using the Great Telescope has been compleated about two years ago by a plan more simple and better calculated for the purpose than the original one at a very great saving to the Good Town but in finishing the same the expence has exceeded the sum allowed by the Good Town in Forty three pounds three shillings and two pence half penny Sterling which it is submitted. Mr Douglas ought also to be reimbursed of the same as instructed by vouchers and decreet arbirtal of Mssrs Sibbald and Sherrif produced. The Observatory being thus compleated and reported to be so by Mr Sibbald overseer of the Towns works Mrs Douglas then presented a Memorial to your Honors predecessors stating the facts above represented and craving that the Good Town would implement the Conditions of the original agreement entered into between them and Mr Short conform to two Acts of Council the one in May and the other in July [seventeen?] seventy six by fixing the rate of the Tickets to be taken out and paid by the Students etc. This Memorial was remitted to the Professors of the University to report upon the rates of these Tickets and the of collecting them but owing to the indisposition and subsequent decease of their principal that Memorial has been lost among his papers, and Mr Douglas after so much delay and having expended between five and six hundred pounds Stel of prize money received by him since the conclusion of the American War, in supporting his family and keeping the Instruments in order, while he kept himself idle in expectation of a comfortable settlement by getting the original agreement between the Good Town and his Grandfather concluded at last despairing of success has been oblige to go to sea again after leaving a power

with the Memorialist to settle these matters – The hardships which the Memorialist labours under from unfortunate circumstances, and being left with three infant children, besides the distress and danger attending her husband will be easily perceived by your Honor, and as the observatory is now compleated ant the Great Telescope ready for public use and utility, she doubts not that in justice to Mr Shorts representative as well as for the good and utility of the public in a matter so much desired for the progress of Astronomy and instruction of youth in the University of this Metropolis, you will now be induced to take the matter into you most serious consideration and adopt such method as may appear most eligible for patronizing and rendering effectual an institution of such utility to science and instruction, and that so as to afford some renumeration to Mr Shorts representative as well for the great loss sustained in waiting so long for the event as for the valuable gift of the Great Equitorial Telescope which for Elegance magnitude and real utility, in the first of its kind in Europe, and for which Mr Short had been offered one thousand two hundred pounds Sterling from the King of Denmark and a little before his death he was instructed by a letter from Monsieur Gerrard ad Bourges in Berry to dispose of it to him. Your Honours will observe that by the foresaid Acts of Council [seventeen?] seventy six Mr Short agree to dispose in perpetuity the property of this great Telescope and whole apparatus thereof to the Town Council of Edinburgh as representing the community and on the other hand the Town Council were to grant a Liferent Tack to Mr Short and Mr Douglas his Grandson of the ground and houses with the whole emoluments and profits of the Observatory but the rates to be demanded from the Students were to be fixed by the Council however as the observatory has only been lately compleated, and before which the Grand Telescope could not at all be used. Therefore that Telescope has not yet been disponed to the Council nor any Tack of the Observatory, granted by them nor any rates fixed for Students to pay and consequently there have been non hitherto paid so that except the building of the Observatory the agreement stands at present incomplete as it was at the state of the Act of Council which is more than seventeen years ago, and during this space Mr Short first, and then his representative have totally exhausted their circumstances in expectation of obtaining a comfortable livelihood by the completion of this agreement, as for instance were the rates to be paid by Students fixed at five shillings each during the year the same would amount to a considerable sum per annum, and would afford a comfortable living whereas Mr Short in a Condescendence given out[?] by him to the Court of Session sometime before his death declares on his conscience that he had not [?] average received more that Eight pounds Sterl per annum for the Observatory, and was obliged to give Ten pounds yearly to an Assistant, and since Mr Short's death Mr Douglas has not ever been successful. – It is now humbly submitted to your Honors that a final and equitable agreement ought to be immediately concluded by the Town obtaining a compleat right to the Telescope, and by their fixing and enforcing rates to be paid by the Students as will afford some compensation for the value and utilit of the Instrument, and the great loss sustained by the time elapsed in expectation thereof and grant a Tack to Mr Douglas and his heirs for such a number of years as may be thought equivalent to the value of the said Great Telescope, or otherways that the Honorable Council would take this useful Observatory, under their own direction, and as Patrons put the same under management of the Preofessors of the University upon payment to Mr Douglas and his heirs of an annual sum adequate to the Interest of the original value of the Telescope and houses built at his sole expence and that for such a number of years to come as may be thought just and reasonable for ceding the property

for it will occur to your honors that in justice and equity the Seventeen years which have elapsed since the date of the Act of Council ought be no means to be considered as a part of the liferent Tack then intended seeing those years have passed without any profit – nay, with great loss to Mr Short and his Grandson by the Observatory not having been built for the reception of the great Telescope, nor the rates fixed by the Students – The Memorialist, upon the while submits herself to the Justice of you Honors being fully confident of your candour and benevolence, and you readiness at all times to Patronize and promote every useful science. – May it therefore please the Honorable Council to consider the facts before represented, and order payment of the several sums necessarily expended as aforesaid and to order and appoint such final settlement respecting the Observatory and Instruments belonging thereto as to your Honors shall seem just and equitable to Mr Douglas and his family and to you shall appear to be most beneficial to science and useful knowledge, and other ways[?] to do and direct in the premises as you shall see cause.

According to Justice signed/ Elizabeth Douglas.

Appendix B: Letters from Maria Short to Town Council, 1827-1828

ECA D0105R

11 December 1827

Sir,

Being desirous of stating a few facts relative to my case may I take the liberty of requesting you to forward this before the Committee & Council.

It has been alleged that my father instead of attending to the erection of the Observatory greatly promoted the building of the turret. This seems to be a mistake as the entire plan was wholly under the direction of the magistrates. This appears in a document in my possession where also the <u>delay</u> <u>complained</u> of is accounted for and by no ["no" is inserted] means <u>ascribable</u> to my <u>father</u>.

On my return from abroad I was advised to make a similar application to that which is before the Council, but having no absolute occasion, I declined & fully persuaded that if ever I required to come forward in this manner, the magistrary of Edinburgh would not leave unfriended <u>unprovided</u> the daughter of one who had so largely contributed with a view to the benefit of the Public (next page) and altho that contribution had not the beneficial effects contemplated by the <u>donor</u> yet the sacrifice as it respects the interest of his family was not the less on that account. My misfortunes were further increased by the repeated lawsuits towards which my parents were obliged to sustain in consequence of the disputes originating from the different views entertained by the subsequent Councils so that the greater part of our property was exhausted thereby. I cannot therefore help ascribing the origin of all my difficulties to one <u>source</u>. The /to me/ unfortunate contract and the delay of the Council in fulfilling <u>their</u> part.

In the first place with respect to the restriction of the lease to the male heirs, my father who was kind & humane, as well as generous would not enter into this contract with a reckless disregard to the interest of the most helpless part of his family, he contemplated in the establishment a sufficient scope for providing [next page] for them, and in the second place had the contract been fulfilled in a reasonable time, it is not improbable to suppose that my circumstances might have been such as to render the present application unnecessary.

*I have come forward confident from the justice liberallity * humanity which characterize the decisions of the present honourable Council that my statement will be kindly and feelingly received. I have the honour to be*

Sir
Your Obliged Hum. Servant
Maria Short

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9 January 1828

The Right Honorable the
Lord Provost & Magistrates of
Edinburgh

Gentlemen

The papers which were freed into my possession for perusal I have carefully examined. And beg leave to say, they will be found to contain a confirmation of every fact in my Memorial and that I have not made out a fictitious nor an imaginary case. ~~in which~~ but a real one, in which so far from exaggerating, I have even omitted many collateral evils which have all sprung from the same source.

Having compared my memorial with the extra I have marked on the margins of the former, the numbers, and pages of the [?] which contain the facts adverted to,—

It appears from extract No. 1 that Mr. Short anxious to establish an Observatory in Edinburgh, came from London with a collection of Reflecting Telescopes: amongst which was the great Equatorial one, for which he had refused £1200 from the King of Denmark. This he dis[?]ed in perpetuity to the Public, reserving for himself & heirs the emoluments through[?] and in default of heirs the whole subject to involve on the Council as representatives of the Community.

The second contains a restriction of the subject to Male Heirs at the suggestion of the Magistrate, who held out a prospect to Mr. Short that he would be saved the expense of building, and that "On account of this it was reasonable" he should consent to restrict the subject to Male heirs. The second Contract was regularly entered into and signed by the Parties. Yet it appears it was not till 1791 three years after Mr Shorts death and fifteen after it was

entered into that the expense incurred for the first building were defrayed by the Council who at the same time issued orders for procuring estimates for building the Tower, which was not completed so as to receive the grand telescope till 1798 seventeen years after the Contract was entered into. At the same time the fees to be exacted from the [?] were also fixed.

It also appears from the extracts that the while expense of the Building did not exceed a third of the original value of the telescope and that the half of that expenditure was incurred by extraneous matters.

It is much to be regretted that my father was thus diverted from his first plan. Had he adhered to it Edinburgh from that period would have enjoyed the advantage of a respectable Observatory, such an establishment headed by a man of genius would have drawn considerable emoluments which would have been a sufficient inducement for Mr Short's heirs to have kept it in repair, so as to preserve the telescope both for their own benefit and that of the Community.

In conformity with the spirit of the second Contract Mr. Stodard the Lord Provost laid the foundation Stone of the Building on the 25h of August 1776 the magistracy assuming the entire direction of the whole. by the different views & sentiments entertained respecting it, by the subsequent Councils the Building was abandoned, and Mr. Short left to struggle with lawsuits instituted by the tradesmen who had been employed by the Council. As the /the Council/ seemed not only to have refused granting pecuniary supplies themselves but even objected to the proceeds of a course of lectures being applied to the Building and also discouraged subscriptions whilst at the same time, in virtue of the second contract they always maintained their right to the Restriction of the subject and Emoluments to the Male Heirs.

My father in consequence of this treatment seems to have fallen into declining health & embarrassed circumstances so as to prevent his continuing the Building at his own expense, ~~for it appears~~ when he was almost overwhelmed by difficulties, in order to relieve himself from the Claims and enforce the Completion of it according /to the Contract by the Council,/ he had recourse to legal measures. The Sequel [?] proves how unavailing either to him or his family these steps would have been, even had they been resorted to sooner, for it appears that the Council resisted a Decreet given in Mr. Short's favor by the Court of Session three years after his death.

Mr Short in consenting to exclude his daughters, could not thereby intend to leave them destitute, he no doubt contemplated providing for them, from the emoluments to be derived from the establishment. And also to reserve for them that money which /according to the first Contract/ he had intended for the erection of the Building, but which was entirely exhausted by the expenses and delay.

The above remarks I hope will serve to illucidate my Memorial, which as it contains a faithful representation of my case. I beg leave to request your worship may again take the trouble of referring to it.

Impressed with a sense of my misfortunes I have endeavoured to make your worship acquainted with them and that their cause. And from the high sense of honor and humanity by which the present magistracy are known to be actuated. I hope I shall not in vain have made an appeal to their Justice — I have the honor to be

Gentlemen
Your Obedient Humble
Servant
Maria Short

---

22 March 1828

My Lord

Having oftener than once experienced your Lordship's patient & kind attention may I flatter myself you will pardon my importunity in again troubling you on a subject in which my happiness is so much involved.

The Gentlemen of the Committee after having perused the Extracts will now be aware that had the First Contract my Father made with the Magistrates been adhered to, the Observatory would now be in my possession, and on a plan very superior to what was afterwards afforded by the Council a sketch of which I have in my possession.

But Mr. Short was advised as the Extracts prove to forego the first contract and enter into a Second in which at the Suggestion of the Magistrates he agreed to exclude his Heirs Female on Condition that the Observatory was to be erected free of expense to him.

I feel it is unnecessary to state to you my Lord that a bargain is equally obligatory on both contracting parties, my Father's part in the Second Contract after having given up the Instrument was to exclude his Daughters this he did by the bargain. The plain & obvious duty the Magistrate had to perform was to erect in a reasonable time a building sufficient for the proper application of the instrument. This they did not do. And it is on this circumstance & the losses to which it subjected my family I ground my Claim.

My Father in acceding to the Second Contract could not harbour in his mind a doubt but that an Observatory becoming the Metropolis of Scotland would immediately be erected, trusting to his own powers the practicability of rendering the bargain equally advantageous to his family as beneficial to the Public.

It is evident Mr. Short on being prevailed on to exclude his Daughters intended to provide for them from the emoluments of the Establishment & the Money he had intended to appropriate to building but which was afterwards all exhausted in expenses consequent on the Delay. These circumstances therefore rendered it a duty the more imperiously binding on the Magistrates to order the immediate completion of the building that being the only means the care afforded Mr. Short to counteract injurious effects the Exclusion obviously had on the interests of his Daughters.

It has been said that there is no limited time specified in the Contract for the completion of the Building but I am certain my Lord you will readily admit the Contracting Parties must have understood it was to be finished immediately as otherwise the instrument could be of no use

and Civil Law in this case would have decided that it was incumbent on the Magistrates to fulfil the contract in a reasonable time, or awarded Damages proportionate to the injuries sustained by the Nonfulfilment thereof.

I am confident my Lord your high sense of justice would not for an instant allow you to consider the Contract fulfilled to my Father by the Observatory being built after a lapse of seventeen years after the bargain was entered into, my Father only lived twelve years after this period allowing, two for the building the remaining ten might have been profitably employed in prosecuting his plan of giving Lectures, the facility which the possession of an instrument of such high magnifying power afforded for the illustration of Astronomical Sciences, was greatly superior to what any other Lecturer enjoyed, and held out to Mr. Short a very favourable opportunity for renumerating his family for the sacrifice he had made of their property to the Public. The novelty as well as the utility of such an Establishment, could not have failed to interest the inhabitants of Edinburgh, where the cultivation of intellectual attainments is so generally & so highly appreciated. Under these circumstances had the Observatory been finished in proper time, my Father thereby would not only have been able to extend his usefulness to the Public, but also to have preserved a handsome competency to his family in place of which they were ruined in the Delay & consequent derangement of his affairs.

That this Delay could be ascribed to my Father is impossible, his every wish as it was his interest must have been to have the bargain completed immediately had he wished to trifle away his time, he could not have done so without sacrificing his children's property to the Public. He was a man of too mild a disposition to give offence, as is evident from his having confided himself to entreaty and expostulation till he found himself on the brink of ruin, when in order to relieve himself from lawsuits instituted by the Tradesmen employed by the Council he had recourse to legal measures. The Decreet that was given in his favour in a proof that the source of delay did not originate with him, and the Resistance which by the Council made to the Division of the Court of Session is a proof that it originated with them and must have proceeded either from disinclination or misapprehension.

It has been alleged that Mr. Short's widow had abstracted the Telescope from the Observatory, to this I have to say my Lord at my Father's death my then surviving parent under the impression that in consequence of the Nonfulfilment of the Contract the telescope belonged to her children did keep possession but as the extracts prove was forcibly dispossessed and such harsh measures used as to injure her health to such a degree and soon after to occasion her death leaving her infant children without a friend to vindicate their cause. I have also to add that the telescope never received any injury from any part of our family having seen it myself erected in the Observatory in a perfect state of preservation long after the death of Mr. Douglas/Mr. Short's grandson - so that any injury it has since sustained must have proceeded from the damages occasioned by the ruinous state of the Observatory and the carelessness of the person to whom the Magistrate gave it in charge.

It has also been observed in opposition to my Claim, that my Father intended to limit the Observatory to himself. I grant this, and if he had I would now be proprietor. But they agreed to build it. That intention of his, surely cannot by any application be made to invalidate my Claim.

And with still less effect could it be converted into an excuse for the Nonfulfilment by the Magistrate.

Regarding the circumstance my Lord of my not having applied sooner for Redress, this is fully accounted for in my Memorial, it will I trust be considered as a matter of Merit than of Objection as in was not until compelled by Unfortunate Occurrences that I made an application to the Quarter on whose consideration I feel I have such strong Claims.

I am confident you Lordships & the Honorable Council will not overlook my Claim because it is not proffered sooner. I am unacquainted with Law but I believe a Contract is not subject to Restriction but remains in force forever, except annulled by the contracting parties and if it can be proven that it had been fulfilled by both, the inujred party giving sufficient reasons for not coming forward (as in the case of Minority or absence) would be awarded damages for the Nonfulfilment in a court of Law.

I have been told by my Lord that it is difficult to judge of the merits of my case from its being involved in obscurity in consequence of distance of time too. Almost every fact stated in my Memorial is confirmed in the Extracts. The City Records show that my father when he came to Edinburgh for the purpose of establishing an Observatory possessed considerable property in and near the city which I can prove (if requisite) was exhausted in lawsuits etc.

Pardon me my Lord for thus intruding on your time, the best apology I can offer is that my extreme anxiety has prompted me to attempt to advocate my own Cause - I wish I could also be Judge - or that every Gentleman of the Council could enter into my Feelings for I am certain that were my Case properly understood there would not be a feeling harboured hostile to it.

Therefore permit me to hope my Lord that under your presidency that Honorable Council will not allow the Daughter & Niece of Men celebrated for their Genius (who in their day attended the Boundaries of Science and whose labours & intentions directly tended to the Comfort & Happiness of mankind) to prefer a just Claim without awarding an Address proportionate to the Exigency of her Case. And Allow me further to add my Lord that what may be also in my favour is that my present application can scarcely form a precedent for any other, as my case has, I believe, no parallel, there being an instance on record of the daughter of a Man of Genius instead of receiving Benefits, receiving injuries (however unintentional) from her Native City, I have the honor to be

My Lord
Your Lordship's
Obedient Humble Servant
Maria Short

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28 March 1828

My Lord

As the enclosed only contains a few arguments in opposition to a number of objections made to my Claim by the Gentlemen of the Council, perhaps before they were sufficiently informed as to the merits of it. May I beg leave once more to request your Lordships further indulgence.

I came forward my Lord to profer my Claim under the impression, that, as in point of justice/perhaps also in Law/ it is an irresistable [sic] one, it could not possibly by overlooked by the Representatives of my Native City and that altho in consequence of misfortunes I have been a stranger. Yet Justice will as conscienscious[ly] [sic] be adhered to in the judging of my case by the Honorable Council as if I were supported by the strongest interest and as the Nonfulfilment of the bargain is clearly shown in the Records, the cause of which could not possibly originate with my Father who with his family were severe sufferers thereby your Lordship & the Honorable Council will take my Case into consideration and grant Redress. And I trust it will not be considered presumptuous in me to suggest that the Redress may /if it must the approbation of your Lordships & the Honorable Council/ be in the form of an Annuity.

I confess my Lord I am most sanguine as to the decision of my case by your Lordship & the Council being certain if clearly understood there will not be a dissentient[?] voice, as no upright or [next page] honorable mind would permit an orphan female to be a sufferer, if he could remove the cause, as my application could form no precedent for any other in its having no parallel and permit me to add my Lord as Edinburgh would not be much Richer in withholding from me my <u>due</u> nor much Poorer in awarding my Redress if not [?] to my loss at least proportionate to the Exigency of my Case.

In requesting you Lordship to pardon me for giving so much trouble–I have the honor to be

My Lord
your lordships
most Obed. Humble Servt
Maria Short

Appendix C: Letter from Maria Short to the Gentlemen of the Society of Arts, 1831

NLS Acc4534/13

31 South Bridge Street Edinburgh
April 12th 1831

Gentlemen

In taking the liberty to address you, I most respectfully beg leave to request your attention to the following statement respecting Short's Telescope, which I beg to remind you about a year ago was a short time before the Public – And not to trespass too much on your time, I shall briefly confine myself to the following short detail –

That this plan which was adopted for the disposal of the Instrument having been completely checked in its progress in consequence of its being dismantled, and otherwise out of repair, which was the objection opposed to it by almost all those who refused to subscribe I have therefore, I beg leave to state, sent it, for the purpose of being repaired to Mr. Tulley one of the first Opticians in London, who is now engaged in fitting it up in the best style in order to render it an object of interest & attraction to the Public, to whom it is intended to be offered for Exhibition. That in consequence of this arrangement having become responsible for a considerable sum, a great part of which being yet to make up, and having no other means of defraying it than by the assistance I may be so fortunate as to procure from the enlightened & liberal minded I am now most anxiously endeavouring to obtain the patronage of those to whom I most naturally look up for countenance & support.

Therefore as the only surviving descendent of Individuals whose whole lives were devoted to the advancement of Science: An unprotected female embarked in an Enterprize, on the success of which hangs her now entire dependence, an Enterprise whose result I trust will secure the approbation of all parties. I most respectfully & most earnestly solicit your support & patronage. And in humbly trusting that the circumstances in which I am at present placed will plead my excuse for this intrusion.

I have the honor to be
Gentleman
You Most Obed. Humble Serv.
Maria Short

P.S. The plan which I have been advised to adopt to enable me to meet the expenses incurred by the repairs etc. is to endeavour to issue General Admission Tickets as a small charge not to exceed <u>seven shillings</u>, amongst the different Literary & Scientific Bodies, the members of which, /who have not already subscribed/, might, were my case recommended to their attention be willing individually, to advance a small sum for this purpose – Any Gentlemen, therefore, who may generously wish to become a subscribers is requested merely to add his name to the List as no money is required until the Telescope is about making its appearance, which will not take

place until a sufficient number of subscribers is procured – The original power & perfection of the Instrument can be vouched for by several amateurs of this City, who had formerly opportunities of witnessing its primitive [?] excellence. M.S.

Appendix D: Protests against Maria Short's Popular Observatory on Calton Hill, July 1834

From *The Scotsman*, 23 July 1834

EXHIBITION OF SHORT'S TELESCOPE – DESECRATION OF THE CALTON HILL

Letters were read from Professor Wallace, the Solicitor-General, and a petition from the Astronomical Institution, complaining of the erection of a half stone half wooden building on the finest point of the Calton Hill, for the exhibition of certain optical instruments, an erection which would greatly injure the appearance of the Hill, and would tend to collect numbers of bad characters about that spot during the night.

The petition from the Astronomical Institution stated that they had the best authority for saying, that the testimony in Miss Short's favour appended to her paper so industriously circulated, was given for a very different purpose from that which it has been employed. Its object was to enable her to sell in some way an old instrument which belonged rightfully to the public, but which a former Town Council, in the exercise of an easy generosity, gave her as a boon. In conclusion, they most respectfully request that the Town Council, as trustees of the public property, as guardians of good morals, and as patrons of the University, with which the Edinburgh Observatory is more closely united, will take what has been set forth into serious consideration, and will not allow an erection so paltry as that proposed to be placed almost in contact with the monument of the Hero of the Nile and adjoining to the Classic Memorial raised by Friendship of Playfair and Stewart, that it will on no account whatever allow a piece of deformity to usurp the station from which strangers delight to view our city, and that under the spacious name of an observatory, it will not allow a paltry show box to be placed, as if in derision, close to the Edinburgh Observatory, the freewill offering to science of two hundred Scotsmen.

A letter on behalf of Miss Short, the proprietrix of the telescope and other objects of exhibition, was read, complaining of some attacks which had been made in the newspapers on the structure to be erected on the Calton Hill which, in the writer's opinion, would be no deformity.

Mr Smith said that in his opinion the structure was not calculated to be offensive.

Mr Aytoun said that he had conversed with Mr Gillespie Graham on the subject, who had stated that the building in question would not be offensive, for the Calton Hill was so offensive already that it would not be easy to make it more so.

Mr Robertson moved that the order for the erection of that building be recalled, and asserted that if this structure was allowed to be built the Council would be a mark of scorn, that

the memories of its members would be held in detestation, and that there never was an act of any Council that would be more execrated. He was sure had the Council known what they were about; they never would have sanctioned its erection.

The Lord Provost said that the Council had no object or interest in offending public taste, and since the complaint had been made he had endeavouring to find some other spot less open to objection than the point originally chosen. He had been in correspondence with the Committee of Management of the National Monument, who had no objection to allow this structure to be erected within it; but subsequently the Astronomical Institution had objected to that spot also. He thought, then, if Miss Short could be prevailed upon to accept of the intended site for the Debtors' Jail, there could be objection.

After some discussion, it was remitted to the Lord Provost to correspond with Miss Short on the subject.

CALTON HILL

The following is a copy of the Solicitor-General's letter to the Lord Provost, on the threatened desecration of the Calton Hill, which, with its natural beauty, its fine terrace walks, and its costly architectural decorations, is fast rising to the dignity of a classic Acropolis. We need scarcely add, that the letter is written by Mr Cockburn, not in his official capacity, but simply as a citizen of Edinburgh, whose taste leads him to feel an interest in the beauties of our romantic town—of which beauties, indeed, he has ever been a most watchful guardian. The observations on the subject in our last were borrowed from the [Caledonian] Mercury; and we are glad to see that our contemporary has since followed them up with others in the same spirit. The Council, however, settled the matter yesterday in a satisfactory manner.

"14 Charlotte Square, 19th July, 1834

"My Dear Lord,—Allow me again to call your attention, and that of the Town Council, to the mistake which has been fallen into in permitting the erection of a half stone and half wooden booth for shows on the very finest summit of the Calton Hill.

"I need not explain to any person of intelligence, the effect of this profanation of that sacred ground. The proposed structure in itself will be abominable. It is intended for a Camera Obscura, and for other such exhibitions, and therefore is naturally proposed to be placed on that eminence which commands the finest prospect, and which is most glaringly visible from the greatest number of the most important points in Edinburgh. It will no sooner be raised and fairly seen, than there will be one unanimous and most just cry of indignation from every quarter. But it is not this individual structure that is to be looked to. If the example be once set, nobody can fail to see that the Calton Hill will henceforth become the receptacle of Panoramas, Caravans of wild beasts, and all manner of public show boxes. The progress is inevitable.

"Now, you're Lordship and the Town Council are the guardians of Edinburgh. But be assured that under this word, Edinburgh, nothing so important is included as the preservation of the beauty, and the decorated public ground of the City. Our College has given us some fame; our

Courts of Justice some importance; and our general literature has covered us with splendour. But all this is literally nothing, when compared with the glories of our external position. In reference to this, our peculiar attraction, the citizens have a deeper interest in saving the Calton, not from elegant architecture, but from vulgar abominations, than any other circumstance in their situation. It is dreadful to think what has been done for that place, and to anticipate its being converted to base uses

"Let me therefore, with an earnestness which I cannot express, implore you all to do honour to yourselves by instantly preventing the further progress of this error. I wont talk of the consequences of you is not doing so, because I have perfect reliance on your Lordship and on the Council.

"At any rate, I beg you to excuse this interference. I have no more concern with the matter than every other citizen has; but I should ill discharge the duty which I owe to the Council and to the City, if I had not, the very instant that I heard of it, submitted the matter to reconsideration.

Yours, very faithfully.

Appendix E: Petition by Maria Short to Town Council to build a new observatory, 1845

28 October 1845, ECA TC Minutes (244) 474-478

Read a report by the Lord Provost's Committee to whom was remitted Petition of Maria Short; which is Petition and Report are of the following tenor: —

"Unto the Right Honourable the Lord Provost, Magistrates and Town Council of the City of Edinburgh, the Petition of Maria Short, Proprietrix of "Short's Observatory" Calton Hill, Edinburgh, under permission of the Council, Humbly Sheweth, That you Petition has been induced by a number of highly respectable Citizens of Edinburgh and others, to apply to your Lordship, the Magistrates and Town Council for permission to erect an improved Observatory in lieu of the present, and upon a more eligible site, in its immediate neighbourhood.

["25 May 1835" in margin]

That of the date your Petitioner opened the present Observatory with a very fine collection of Optical Instruments which had been tested and pronounced "very excellent" by Sir James South and other eminent individuals; and the accompanying Prospectus will shew that the undertaking was commenced under the sanction of most of the eminent scientific characters in Edinburgh and was also patronized by many of the nobility, gentry, etc.

That owing to the limited size of the building, which can scarcely contain more than twenty individuals, the inconvenience on the occasion of an Eclipse or Comet has been very

great, the parties being obliged to remain at the door till the house emptied, and this circumstance has deterred many from visiting the Observatory from the dread of this necessary delay and exposure to the weather.

That in consequence of the smallness and inconvenience of the building your Petitioners largest Telescope one of the finest of its class, and made by the Shorts, can never be used; the next in dimensions by the late Tulley, very seldom; and even the third in dimensions (a Dollond) and others, are generally used out of doors, where, being exposed to the wind, which causes a constant vibration, the Observation must be imperfect and unsatisfactory.

Visitors also complain of the cold, especially in Winter, a defect hardly curable in a Wooden Building, so exposed that the greatest disappointment however, experienced by the Visitors, has arisen from the obstruction caused by the National Monument at the view of the moon and all the other Planets at certain periods of their orbits is thereby obstructed.

That the Solar microscope, a most powerful, useful and interesting Instrument from the same obstruction cannot be used during two hours every day.

Your Petitioner under these circumstances respectfully requests the favourable consideration of Lordship, the Magistrates and Town Council to her proposal to erect a very handsome and ornamental stone building of the dimensions and according to the plan and elevation herewith submitted on a retired spot about one hundred and fifty feet due south of the present building, and this site, your Petitioner may observe has already been favourably considered by the Council, being one of three sites allowed your Petitioner for selection in the year 1834.

This site is not only best adapted for the purposes of the Observatory, but it is also one where the proposed building can in no way interfere with, and will in all respects harmonize with, the other erections on the Calton hill.

This Site is never used and even as a bleaching ground, whereas, the Site of the present Observatory which this grant would restore to the Public, might be usefully employed.

The Petitioner has only further to state her anxious desire that your Lordship the Magistrates and Council should understand that her principal object in obtaining the proposed grant is to secure to the Citizens of Edinburgh the full benefits of a popular Observatory, and accordingly the Petitioner will not object to whatever necessary conditions or stipulations your Lordship the Magistrates and Council may think it reasonable to make, for securing the accomplishment of that important objet.

May it therefore please your Lordship, the Magistrates and Council to consider the premises and grant to your Petitioner, a warrant to erect a new Observatory in lieu of the present, and in the situation above referred to, conform to the plans produced herewith, and under such conditions as to your Lordship the Magistrates and Council shall seem reasonable, And you Petitioner shall ever pray" etc.

Appendix F: Rules for the Guide to Strangers visiting Calton Hill, January 1850

8 January 1850, ECA TC Minutes (253) 162-165

To be furnished by the City with a blue coat having a distinct badge on the arm, a scarlet collar, and city officer buttons, and with a hat. This dress to be worn at all times when on duty on the Hill. Likewise to be sworn in as a Constable and provided with a Baton.

To be provided with a Box wherein to shelter himself during bad weather.

To attend on the Hill every day during such hours as may from time to time be fixed by the Magistrate in charge of the Hill.

The Guide shall not take up any fixed position on the Hill, but shall perambulate the principal walks pursuing generally the route commencing at the Stair opposite the Prison and continuing along the West side and round the Hill to the road descending to the said stairs.

To place in the hands of Strangers Cards referring to the different exhibitions, to be furnished to him by the City. To answer respectfully all enquiries made by Strangers and to avoid every thing which shall shew a preference for one exhibition over another. To do what he can in conjunction with the Police to keep the Hill free from improper characters. From time to time to report to the Magistrate in charge of the Hill any thing he may observe amiss or as to which he may require further instructions.

The Guide shall be allowed 12|[s?] weekly.–This wage shall be paid to him by the City Chamberlain who shall call upon each of the parties for his quote thereof in advance one a month.

The Guide shall not, in any manner of way, employ himself in the Service of the Keeper of any of the Exhibitions or receive from them any gratuity whatever.

These Regulations shall take effect on and after 1st January 1850."

Appendix G: Reasons of Protest against the resolution to remove, June 1850

18 June 1850, ECA TC Minutes (254) 104-109

The following Reasons of Protest by Councillor Redpath were read and ordered to be entered on the Minutes:– "Reasons of Protest by Councillor Redpath against the resolution of the Council to remove Short's popular Observatory from the Calton hill.

Councillor Redpath in the name of himself and any others who may adhere to him protests against said resolution for the following Reasons: –

Because the removal of the Observatory from the Calton hill will not only take away from the inhabitants a source of innocent and instructive amusement, which is also resorted to annually by thousands of Strangers from all parts, and if an object of attraction to Edinburgh the want of which cannot be supplied otherwise, but further the removal of the Observatory in the summary manner proposed, and at this particular season of the year, would inflict a serious patrimonial injury and loss to the proprietors of the Building and may be the means of entirely ruining them by taking away their ordinary and at present their only means of subsistence. It is well known that the Observatory is little visited in Winter and therefore to shut it up at present, being the Season when Strangers chiefly resort to Edinburgh is the more injurious and prejudicial.

That in the opinion of the Undersigned so very severe a sentence as this, affecting [next page] even to the humblest individuals and affecting also the public interest as above explained, ought not[inserted] to have been pronounced excepting on very substantial grounds, and also after hearing the parties concerned, and a thorough investigation by evidence, so as to shew that no other or milder remedy could have answered the same purpose. – Instead of this however the Motion for removing the Observatory was made without any previous notice, on the simple reading of a Police Constable's report, without putting the Constable on Oath, and without he parties concerned being called, or any charge whatever exhibited against them; – Of course no defence was allowed and not a single Witness was examined. The undersigned protest against the proceedings as utterly subversive of justice and also unworthy of the dignity of the Council, who ought upon no occasion to condemn any party even to the smallest punishment unheard, and without confronting them with their accusers and allowing each party a fair and impartial trial.

Because even taking the Police Constable's Report as evidence although that Officer was not examined [next page] upon Oath, nor cross-examined either by the Council or by the party accused, that report contains no statement of any facts whatever sufficient to warrant the sentence now protested against. The Report mentions various things as violations of the Rules which are plainly no such, as the things so mentioned were never prohibited by the Council and therefore ought not to have been taken notice of. The Report of the Constable however being at the utmost only that of a single Witness cannot possibly be held as conclusive evidence or such as to exclude farther investigation.

Because the reasons state by the Lord Provost in making the Motion were not founded so much on any thing done by the Keepers of the Observatory as on the circumstance that the Council had been so frequently been "worried" or molested on the subject that his Lordship seemed desirous to get quite of it at once by the Summary removal of the Observatory. His Lordship however entirely overlooked the fact that the molestation referred to had arisen from various [next page] causes. In particular the Council themselves having allowed two other exhibitions on the Hill, a rivalry to a certain extent was the necessary consequence to restrain and regulate which, the Council, instead of laying down stringent rules and remitting to the ordinary Police of the City to enforce these rules by suitable penalties, which was the obvious way to avoid all further trouble. The Council had taken the Hill under their own peculiar chard and appointed a Councillor and also a Constable for the expense of which the exhibitions have been assessed at a certain sum per week. Under this system of course constant complaints are

made first to the Councillor taking charge of the Hall and then through him to the Council Board by which means the Magistrates and Council have been too often annoyed and troubled or rather have too often annoyed and troubled themselves about a very trifling matter which would have been far better managed if left to the ordinary Police of the City who might be instructed to see every necessary regulation [next page] strictly enforced and to have every transgressor brought up to the ordinary Police Tribunal and punished after a fair investigation and proof in the ordinary way." (Sigd) David Ridpath, Alexander Hay.

Appendix H: Reasons of Dissent and Protest, October 1850

22 October 1850, ECA TC Minutes (254) 439-444

Reasons of Dissent and Protest by Councillor Ritchie, in name of himself; and of any others who may adhere to him against the deliverance of the Council of 1st October Current, approving of a resolution of the Meeting of 17th September instructing the Pord Provost to order the removal of Short's Observatory from the Calton hill before the then next Meeting of Council:–

Because the said resolution of 17 September was adopted, and has been carried into execution, without the Council having a proper opportunity of considering the same, no previous notice of the Motion having been given, and the object of said resolution being to be carried into effect before next Meeting of the Council, precluded the possibility of the Minutes being approved of at a subsequent Meeting as required by the Standing orders previous to the Motion being acted on. It was therefore irregular and ultra vires to demolish the Observatory under these circumstances, and such a proceeding, if sanctioned, may form an unadvisable precedent, any small number of Councillors happening to form two-thirds of a thin Meeting of Council may, by following the same plan, have opportunities of carrying resolutions into effect even tho' not supported by a majority of the Council.

Because the summary removal of the Observatory in terms of said resolution was contrary to the understood intention of the Council in their previous resolutions against the continuance of the Observatory on the Calton hill. When said resolution was adopted, the Protester and various other Councillors understood that the resolution would only be enforced to the effect of requiring Mrs Henderson to make a change in the management, which she accordingly did, by conveying the Observatory to four respectable Citizens, who offered to accept and act as Trustees, and to conduct the Observatory in conformity with the wishes of the Council. Other three gentlemen were at the same time proposed as Trustees, but decline to act. The remaining four however accepted and were perfectly competent to discharge the duties which they had undertaken– Notwithstanding of this proposal having been communicated to those taking charge of said resolution, the Observatory was removed, on the morning of Friday, the 27th, while the said Petition was in the course of being printed and circulated to the Councillors. The Protesters have heard and can conceive of no reasons to render this proceeding necessary. They submit that the Petition of the four Citizens before referred to, as well as a

previous Petition, subscribed by four thousand of the inhabitants in favor of continuing the Observatory, ought to have been listened to by the Council, as well as the recommendation of the Sheriff annexed to his Interlocutor in the Process of removing, and in particular no possible injury could have resulted from delaying the execution of the order for a few days, until the Petition last mentioned should have been decided on by the Council.

Because carrying into execution of said order, without giving previous notice to Mrs Henderson, was discourteous and calculated to be most injurious to the interests of the private party concerned. Granting that Mrs. Henderson had only right to the ground during the pleasure of the Council, yet having erected a building, and furnished it with instruments at a heavy expence, the grant ought not to have been recalled without allowing the party a hair hearing and an opportunity of exculpating herself or of palliating or atoning for any errors she might have committed, so far as the protesters know, no such opportunities were however afforded to her – and latterly, without any notice, the Observatory was invaded at an early hour, he Instruments were thrown upon the hill, and the building demolished. Such a proceeding was harsh and precipitate and should Mrs Henderson claim and be found entitled to damages for the injuries thus done to her property, the undersigned, for himself and others who adhere, now protests that they will be liable in no part of such damage but shall be entitled to be relieved thereof.

The undersigned beg to put on Record their dissent and protest against the whole measure, from beginning to end, of removing the Observatory from the Calton hill, in respect that the Council, instead of discouraging, ought to have patronized and protected such an Institution; and the protesters trust that these proceedings have not proceeded from erroneous information, whereby unconsciously the interests of Mrs Henderson and the public have suffered." (Sigd) Robert Ritchie, C. David Ridpath, C, Alexander Hay C, Robert Anderson C.

Appendix I: Cast of Characters and Events

The Adies (active c.1769-1857)

Influential Edinburgh family of optical instrument makers, installed camera obscuras in the Gothic Tower (1816) and the Nelson's Monument (1849). Original partners were London-trained optician John Miller (d.1815) and nephew Alexander Adie (1775-1858); eventually called Adie and Son, after Alexander and John Adie (c1805-1857). Miller sat on the jury for the Downie & McFadzen criminal trial for the raid on Calton Hill (ECA SL233/1/4). Janet Adie (daughter of Alexander/sister of John) married astronomer Thomas Henderson; Alexander drew up the 1834 Astronomical Institution petition against Short's Observatory with William Wallace and Mr. Skene (ROE AI.4, 88). For more on the Adies, see Clarke et al.

Anatomy

Another spectacular form of scientific spectacle in Edinburgh. Alexanders Monro—Primus, Secundus and Tertius—were a father-to-son dynasty of anatomy professors that established and ruled the University of Edinburgh medical school from the 1720s to the 1840s. Burke and Hare murdered ten people in Edinburgh in 1828—the year of Maria Short's reclamation of the Great Telescope—so they could sell bodies to Robert Knox for dissection during his anatomy lectures. Knox was a key contributor to the development of the Royal College of Surgeons' Surgeon's Hall Museum, which has been open to the public since 1832, making it one of the oldest museums in Scotland.

Hugo Arnot (1749-1786)

Edinburgh writer and advocate. Published *History of Edinburgh* in 1779, which chronicles the struggle by Thomas Short et al. to found an observatory on Calton Hill.

Astronomy in Great Britain

Notable events include the 1761 and 1769 of the transit of Venus, and the 1835 passing of Halley's Comet. Discoveries by William Herschel and Carolyn Herschel from 1780s to 1800s. Mid-nineteenth century installations of timeballs at Greenwich and Edinburgh for daily (one o'clock) time signals. Astronomical data collection to support navigation and timekeeping at Greenwich and other observatories. See Holmes and Morus *When Physics Became King*.

The Astronomical Institution (active 1811-c1840s)

Originally a small collective of astronomy enthusiasts, instituted in 1812 as a members-only society of proprietors and annual subscribers. Granted use of Calton Hill property previously given to Thomas Short and heirs. Installed the camera obscura and a private popular observatory in the Gothic Tower; tore down and replaced the original astronomical observatory

in 1818, which became the Royal Observatory of Edinburgh in 1822. AI transferred ROE to state ownership, under the administration of HM Woods and Forests, in the 1840s (NAS MW/5/66). ROE reopened at its present location on Blackford Hill in 1896 (Hermann Brück).

The Barkers

Robert Barker (1739-1806) and Henry Aston Barker (1774-1856). Robert Barker invented and patented the Panorama in 1788 after walking on Calton Hill. His son Henry did the original sketches for his father's first painting from the roof of the Gothic Tower, in the final year of its occupation by Thomas Short and Jacobina Downie.

James Begg

Free Church of Scotland minister and housing activist. Published a pamphlet in response to Lord Cockburn in 1849.

Marion Beugo

Mother of John McFadzen. McFadzen recommended that Beugo care for the Short's after Downie's death (NAS CS236/M/9/10). Sued Joanna, Margaret and Maria Short (Beugo's step-grandchildren) for repayment of a loan by Archibald McFadzen (Beugo's husband) and Gavin Beugo (her brother) to McFadzen and Jacobina Downie (NAS CS232/M/18/6).

Elizabeth Beverly (d. 1795)

Married to James Douglas, grandson and heir of Thomas Short. Held hostage during the 1788 raid on Calton Hill by Downie et al. Penned a letter to Town Council in 1793 that outlines the history of the Observatory (ECA D0105R, See Appendix for transcript.)

Sir David Brewster (1781-1868)

Edinburgh physicist, writer, inventor, polemicist, etc., first secretary of the Astronomical Institution, the Royal Society of Edinburgh, founder of the British Association for the Advancement of Science. Editor of the *Edinburgh Encyclopaedia*. Invented the kaleidoscope, a handheld stereoscope, etc. Promoted the professionalization of science, deplored the antics of university professors obliged to increase class sizes to increase income. Active in Edinburgh during the same years as Maria Short, see Clarke et al.

Duke of Buccluech (1806-1884)

Walter Montagu Douglas Scott, member of British peerage and conservative politician with a statue in Parliament Square Edinburgh. Hosted George IV and Victoria at Dalkeith House, the family seat. Fleming and Short requested financial support and help in securing a Royal Pension

for Short (NAS GD288//588/7). First name listed on the Short's Observatory lists of subscribers (EU ATT 80.P2/21 and NAS AD14/35/359). A proprietor of the Astronomical Institution (EU APS.1.83.23) and holder of 10 shares of the Dumfries and Maxwelltown Astronomical Society ("Observatory" *Dumfries Weekly News* 11 Nov 1835).

Thomas Carlyle (1795-1881)

Conservative Scottish writer. Critic of "Benthamee", Chartism, abolition, orientations in nineteenth-century science towards usefulness and the emergence of computation in science. Originated the Great Man Theory of history, coined the term "visuality", camera-obscura enthusiast. Early writing assignments included articles for *Edinburgh Encyclopaedia* (under Brewster); *Edinburgh Review* and *Fraser's Magazine*. Married Jane Welsh Carlyle in 1826; Moved to London in 1831. Influence grew from the mid1830s. See Baumgarten, Jessop, Mirzoeff, Secord, *Visions of Science* and Frank Turner.

Chartism (1838-1848)

British working-class movement with Scottish support concentrated in Glasgow. Carlyle wrote *Chartism* in 1839, and described demonstrations of "deep dumb inarticulate" crowds, as a symptom of "the condition of England' (Mirzoeff *Right to Look* 132-138). Smout opens *A Century of the Scottish People* by discussing how revolutions in Europe, and Scottish Chartists on trial for sedition in 1848, augmented the threat of popular uprising for the Scottish (7). Lord Cockburn wrote, "The man must be very blind who does not see the shadow of the popular tree is enlarging and darkening; and he must see well who can tell us what its fruit will be. Chartism has superseded Radicalism, and draws the whole starting discontent of the country in its train" (Ibid). Tensions over Chartism and popular revolution may have indirectly impacted attitudes towards Short's Observatory and its struggles on Calton Hill through the 1840s.

Lord Henry Cockburn (1779-1854)

Solicitor-General for Scotland 1830-1834, Edinburgh lawyer, prominent Whig advocate for Reform, promoter of civic beauty. Cockburn's journals, frequently-cited, chronicle life in Edinburgh, and throughout Scotland (as a travelling circuit judge) in the first half of the nineteenth century. Opposed Short's Observatory in 1834 and championed the beauty of Calton Hill throughout his life. The Cockburn Association (founded 1875) and Cockburn Street are named in his honour. See Miller.

Disruption of 1843

The Free Church of Scotland (see James Begg) emerged during a break with the Church of Scotland led by Thomas Chalmers (1780-1847), a subscriber to Short's Observatory. Like Chartism, it may have had indirect and undocumented impacts on Short.

James Douglas (1764-?)

Grandson of Thomas Short, son of Reynald (Renald, or Ronald) Douglas and Ann Short. Husband of Elizabeth Beverly. Brother of Thomas (d. unknown) and Margaret. Earlier occupations include soldier during the American Revolution (Beverly's letter) and Writer (1787 record of marriage to Beverly). Inherited Thomas Short's agreement with Town Council and completed the Observatory in 1792. Unable to earn enough income from the Observatory, returned to sea sometime in 1793. Whereabouts unknown after remarriage to Janet Torry in 1795, identified on their record of marriage as Captain James Douglas of the Scotch Brigade.

Margaret Douglas (c1768-?)

Granddaughter of Thomas Short, sister to James Douglas. Her only vital record is for her marriage to William Wood in 1797. Possibly born Ann (1769) or Cecilia (1767), with a later name change. Chief claimant in cases against Jacobina Downie (for share in the John Short Jr Trust, see Douglas and Downie) and the Shorts (to reclaim Downie's debt NAS CS231/D6/2)

Jacobina Downie (c1760-1796)

Married Thomas Short in 1777. Mother to Joanna, Margaret, James (d. 1788) and Maria. Found innocent of riot and assault for 1788 raid on Calton Hill. Declared married to John McFadzen in 1792 as a result the Douglas case for the John Short Jr Trust. Downie's record of death (age 37) on March 3, 1796 identifies her as "spouse of John McFadzen".

Dumfries and Maxwelltown Astronomical Society (founded 1835)

Private members-only society with a popular observatory that opened in 1836. Their camera obscura, built by Mr. Morton of Kilmarnock (who had equipped his own personal observatory), is the oldest extant, operational splendid camera obscura. See Truckell.

Anne Faulds

Sister-in-law to Maria Short. Married Rev. David Henderson (brother of Robert Henderson) in 1836. Other dates unknown. Primary lender for Short's Observatory on Castlehill. Faulds lent £900 to Maria Short to rebuild Short's Observatory on Castle Hill in 1853 and began suing for repayment in 1858 (NAS CS275/21/22. Faulds's own creditor (William White Millar) tried to evict Short in 1860-61 ("Eligible Premises to Let" *The Scotsman*, 19 Sept 1860; 27 Feb 1961). The case was settled by the splitting the unpaid amount among a number of unrelated trustees who purchased the debt (and therefore the property) as bonded investments. To trace the property ownership and debt on Short's Observatory on Castlehill between 1853 and 1863, see Burgh Sasines for Edinburgh: Vol 64(17;173),Vol 68 (226), Vol 72 (123, 186), Vol 78 (18), Vol 81 (176-202).

Thomas Fleming (d. 1850)

Edinburgh shawl manufacturer. Champion of Maria Short 1828-1831. Lead the Great Telescope lottery letter campaign on Short's behalf. Lauded by the British Press for the posthumous repayment of his debts.

Sir Patrick Geddes (1854-1932)

Bought Short's Observatory on Castlehill from its trustees and renamed it Outlook Tower in the early 1890s. Trained as a botanist but well known as an evolutionist and pioneer of urban planning, improvement and sociology. Member of the Cockburn Association. Influenced by Thomas Carlyle (among others). See Meller.

Greenwich Royal Observatory (founded 1675)

First British facility built for scientific research. Location of the Prime Meridien (the longitudinal global reference point). Nevil Maskelyne (1732-1811) the Fifth Astronomer Royal at Greenwich (appointed 1764), originated Nautical Almanacs (as part of the efforts to establish locational systems at sea) and installed a camera obscura in a turret of Flamsteed House. Other notable Greenwich astronomers include the first, John Flamsteed (1646-1710, appointed 1675), who installed the first camera obscura there and the seventh, Sir George Biddell Airy (1801-1892, appointed 1835-1881) who removed the Maskelyne's camera obscura in 1840. On

Thomas Henderson (1798-1844)

Appointed 1834 as the first Astronomer Royal for Scotland (ROE fulltime observer). Initially made observations at the ROE during his hours off from work as Lord Jeffrey's secretary. Worked at the Royal Observatory at the Cape of Good Hope, South Africa, 1832-1833. Known for determining the distance to Alpha Centauri, and for generating a prodigious amount of astronomical data. Married Janet Adie (d.1842) in 1836. See Hermann Brück. Had the Gothic Tower camera obscura dissembled in 1839 (ROE AI.4 150).

Robert Henderson (1797-1869)

No relation to Thomas Henderson. Identified as a merchant living in London at the time of his 1843 marriage to Maria Short. The census lists his occupation the 1851 as a fund holder and in 1861 as Keeper of the Observatory.

Lord Francis Jeffrey (1773-1850)

Edinburgh judge, Lord Advocate for Scotland, Whig politician. Edited *Edinburgh Review*, 1803-1829. Introduced the Scottish Reform Bill in 1831. Founding member of the Astronomical Institution. Friends included Cockburn and the Carlyles (especially Jane Welsh Carlyle).

The Liddells

Maria Short lived with William Liddell Sr, optician in the early 1830s (dates unspecified). His son, William Liddell Jr. was tried and convicted in 1835, because he defrauded subscribers of Short's Observatory. Short hired Liddell Jr. to write letters but did not authorize him to make any collections. Liddell Jr. also served time for theft in 1833 (one of his victims being William Wallace) and was sentenced to 14 years transportation for a third conviction in 1838. See NAS AD14/35/359; and *The Scotsman*, 28 February 1838.

Agnes MacArthur

Employed by the Astronomical Institution as Keeper of the Camera (obscura) in the Gothic Tower. MacArthur also assumed the duties of her father Peter MacArthur (Keeper of the Observatory) after he became ill (ROE AI 1.3 284-87). She married John Paul and had him named Keeper. Servants of Alexander Wallace (son of William Wallace), who was appointed (live-in) assistant astronomer in 1835, may have displaced MacArthur and Paul in the late 1830s (ROE AI 1.4 122)

Colin Maclaurin (1698-1746)

Appointed University of Edinburgh professor of mathematics in 1725. Co-founded the Royal Society of Edinburgh (as the Edinburgh Philosophy Society) in 1737, with the Earl of Morton and James Short. Maclaurin started raising money to build the first observatory in Edinburgh in the 1730s, but plans were interrupted by civil unrest (the Porteus Riots) and the 1745 Jacobite uprising (which Maclaurin actively opposed). Maclaurin encouraged James Short, but distrusted his brother (probably Thomas Short). See Bryden "The Edinburgh Observatory" and Mills.

John McFadzen

Apothecary, medical student, and military officer. Attended Thomas Short and family on Calton Hill as their physician. Lead the raid on Calton Hill with Jacobina Downie in November 1788. Fined and jailed for "riot and assault" (ECA SL233/1/4/). After Downie's death in 1796, he attempted to make arrangements for her daughters from Fort George Geurnsey, a military post (NAS CS236/M/9/10).

Robert Maclean

Accountant of Excise (customs clerk) and friend of James Douglas. Maclean was seriously injured during the 1788 raid on Calton Hill. He helped Douglas convince Town Council to fund the completion of Thomas Short's observatory in 1792.

The Earl of Morton (1702-1768)

Robert Douglas (no relation to James and Margaret). Co-founder and president of the RSE (1737-1768), president of the Royal Society (1764-1768), astronomer/patron of James Short. First contributor to Maclaurin's observatory fund. Supported Nevil Maskelyne in the longitude debate against clockmaker John Harrison who was supported by James Short. James Short named the daughter of the Earl of Morton in his will, but she relinquished her claim in favour of Thomas Short (Erskine 255-256).

Reform Acts of 1832

Extension of the British franchise to include middle class men. Implemented by Whig Reformers under Scottish politician Henry Brougham (1778-1868) as Lord Chancellor of Great Britain. Brougham founded the Edinburgh Review, University College London (one of several Mechanics Institutes) and the Society for the Diffusion of Useful Knowledge. Associates and former classmates in Edinburgh, Lords Jeffrey and Cockburn wrote the Scottish Reform Act. The Slavery Abolition Act of 1833 also passed under Brougham.

The Scotsman

An Edinburgh newspaper founded in 1817 that still operates as a daily. Hosts its own online digital archive. Primary press source for advertisements, reviews and general news items concerning Short's Observatory. Edinburgh newspapers reported aspects of Town Council meetings not covered in its minutes, which are mostly limited to procedural concerns. *The British Newspaper Archive* carries rival newspaper *Caledonian Mercury* (1760-1867). As a liberal mouthpiece, *The Scotsman* may have been more likely to side with Lord Cockburn against Short, although newspapers often used the same quotes and wording.

Sir Walter Scott (1771-1832)

Tory advocate, judge, writer. Wrote numerous popular historical novels and as architect of the 1822 visit of George IV, helped establish enduring symbols of Scottish identity previously identified with the Highland Scots (i.e. kilts and bagpipes). President of the RSE (1820-1832). A copy of the Great Telescope campaign, with a letter from Fleming, and an engraved drawing of the telescope is located in the Scott's correspondence kept at the National Library of Scotland.

James Short (1710-1768)

Renowned London-based telescope maker and uncle of Maria Short. Third son of William Short and Margaret Grierson, predeceased by older brothers John (a Virginian planter, d.1764) and Alexander (a London-based carpenter, d.1868). Famous for his skill in polishing mirrors for reflecting telescopes, including the 12-inch reflector of the Great Telescope. Survived by younger brother Thomas Short and his oldest nephew James Short Jr. of Virginia.

James Short Jr (c.1752-c.1775)

Sent from Virginia to London to be raised by uncles James and Alexander after the death of his father John Short in 1764. Overcame challenge by Thomas Short as the primary heir to James Short Sr. Died in Lisbon between 1774 and 1776, left everything to his young brothers in Virginia.

Joanna Short (b.1772)

Named John at birth, also known as Johanne and Joanne, etc. Eldest child of Thomas Short and Jacobina Downie. Possibly the child sent away by James Douglas and Robert McLean before her mother's raid on Calton Hill. Fate unknown despite Downie's attempt to place her in the Trades Maiden Hospital, a United Incorporations of St. Mary's Chapel charity school (NAS Acc.8617/14) and McFadzen's desire to have her apprenticed to a "fashionable milliner" (NAS CS236/M/9/10). Boarded with a Mr. Wright? (Ibid). Younger sisters Margaret and Maria were boarded without her by Nicolson Bain (ECA D0105R). Margaret's fate, also unknown. Maria claimed to have lived with a married sister in Ireland who died before her 1827 return to Edinburgh (Fleming subscription letter, multiple sources).

John Short Jr (1763-1794)

Younger brother and heir to James Short Jr. Travelled from Virginia to London in 1785 to settle the estates of James Shorts senior and junior. Set up the £900 trust for Thomas Short and his survivors, overseen by trustees Alexander Keith of Ravelston and John Moir. The John Short Jr. Trust was at the centre of suits brought against Downie and her daughters by Margaret Douglas.

Maria Short (c1788-1869)

The youngest daughter of Thomas Short and Jacobina Downie. Whereabouts unknown between 1799 and 1827. Short claimed that she travelled to the West Indies and then lived with a married sister in Ireland. The middle name Theresa does not appear in records before 1827. Short married Robert Henderson in 1843 and passed away inside Short's Observatory in 1869.

Thomas Short (1711-1788)

Wright and instrument maker based primarily in Leith. Thomas Short's first marriage produced a daughter named Ann, the mother of James and Margaret Douglas. According to records of death, Thomas Short "died suddenly by dropping down in the street" on March 13, 1788, 12 days before the death of the only son to outlive him. The third James Short (1776-1788) "died of a consumption" on March 25, 1788 and was buried in his father's grave.

The Stewarts

Matthew (1715-1785) and Dugald (1753-1824). Father and son professors of mathematics that succeeded Colin Maclaurin at the University of Edinburgh. Financial difficulties likely caused Matthew Stewart to drain Maclaurin's observatory fund. His son Dugald switched from mathematics to moral philosophy and is memorialized on Calton Hill as a beloved figure of the Scottish Enlightenment. Dugald Stewart witnessed the 1782 birth record for John (Joanna) Short.

Town Council

Municipal government of Edinburgh, with thirty-three members presided over by the Lord Provost. Described by Lord Cockburn as "omnipotent, corrupt, impenetrable" (*Memorials* 87). Alongside public works, municipal bylaws and juridical concerns, controlled "not merely what was properly magisterial, but most things conducive to the public economy" (87) including the oversight and leasing of public property, which included Calton Hill—land, buildings and monuments. Town Council founded and oversaw the University of Edinburgh, including the hiring and wage-setting of its professoriate until university reforms initiated in the mid1820s. On the interdependence of town and gown in Edinburgh, see texts by Jack Morrell.

Veronica Wallace (d.2008)

Maria Short's first biographer. Published "Maria Obscura" in 1990 definitively identifying her as the founder of the Edinburgh camera obscura and revitalising the question of whether she was an impostor. Main source for Mary Brück and the entry on Maria Short by Ewan et al, in *The biographical dictionary of Scottish women*.

William Wallace (1768-1843)

Professor of mathematics at the University of Edinburgh after Dugald Stewart's successors John Playfair and John Leslie moved from mathematics to natural philosophy. Wallace acted as the Astronomical Institution's part-time observer until Thomas Henderson's hire (ROE AI 1.3.; 1.4). Wallace questioned the identity of Maria Short in a letter to Town Council in 1828 and opposed Short's Observatory in 1834 (ECA D0105R). The thief William Liddell Jr. broke into his rooms at the university in 1833 and stole instruments from him (NAS AD14/35/359). Wallace's son Alexander Wallace was appointed assistant astronomer to Thomas Henderson in 1835 (ROE AI 1.4).

West Indies

Maria Short claimed to have travelled to the West Indies in her youth. Numerous Scots sought fortunes there as educated professionals in search of employment and landowners looking to raise income for estates at home. Douglas Hamilton asserts that the investment of Caribbean capital in Scotland "explicitly demonstrates perceptions about both the Caribbean as a place of

temporary residence, and the place of Scotland as *home"* (216). In other words, Short's account for her short stay in the West Indies fit a pattern established by other Scots. See also Harper. On Scottish traveller/diarist Janet Schaw, see Coleman.