Public lecturing on astronomy was prevalent in Britain throughout the first half of the nineteenth century. Many lecturers were private entrepreneurs operating lecturing businesses without institutional affiliations. Private lecturers enjoyed popularity in various places and sites ranging from metropolitan theatres to provincial town halls. By focusing on private lecturers, including Deane Franklin Walker (1778–1865), John Bird (d. 1840) and Robert Children, this paper explores the private astronomy lecturing trade and compares it with public lectures that took place inside scientific institutions. The careers of two London-based institutional lecturers, John Wallis (1788–1852) and George Henry Bachhoffner (1810–1879), are analysed as a comparison. Despite the trend towards institutionalized science, the activities of private astronomy lecturers had not been undermined by institutional competitors until the early 1860s. Astronomy remained largely an amateur practice in early Victorian Britain; public lecturing on astronomy was also far from a profession. Many astronomical lecturers, whether private or institutional, were not scientific practitioners working on original research or observational tasks. Some of their lecturing, and particularly their Lenten astronomical lectures, purveyed a distinctive kind of popular astronomy, which was a blend of instruction, amusement and religious sentiments. They indicate complex features of performance and showmanship beyond simply conveying popularized scientific knowledge.

Keywords: astronomy lectures; popular science; popularizers; private entrepreneurs; scientific institutions; Deane Franklin Walker

INTRODUCTION

On 15 July 1865, an advertisement appeared on the front page of the journal Athenæum:

FOR SALE, the original EIDOURANION, or large transparent Orrery, with which the late Mr. Deane, Franklin-Walker [sic] Lecturer on Natural and Experimental Philosophy, illustrated the successful and popular Lectures on Astronomy which he gave in London for many Seasons during Lent.¹

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The sale also included other parts of Mr Walker’s philosophical apparatus. However, it seemed to find no buyers and the same advertisement reappeared four months later.\(^2\)

This unsuccessful sale implied the end of an era. The obituary of Deane Franklin Walker (1778–1865) in the *Gentleman’s Magazine* shared the sentiment:

> The world and science, however, have moved on mightily since the day when ‘Walker’s Lectures’ and the starry scenery of ‘the Eidouranion’ were in the height of their popularity, and the generation that used to talk of him has passed away.\(^3\)

The death of the lecturer embodied the decline of a trade. The private astronomy lecturing trade in Britain had flourished in the first half of the nineteenth century. It had descended from the Enlightenment’s public philosophy lecturing businesses and transformed into a theatricalized spectacle by the early nineteenth century.\(^4\) It reached its heyday between the 1820s and 1840s, yet was on the wane after the mid century.

This article explores public astronomy lecturing from the perspective of the private entrepreneur by means of archive and online newspaper searches. It also compares private lecturers with those who were employed in scientific institutions. The major sources are advertisements or newspaper reports from the databases ‘19th Century British Library Newspapers’ and ‘British Periodicals’ (ProQuest). I also consult the collections of playbills, syllabi and scrapbooks in the archives of the Royal Astronomical Society, the Royal Institution and Manchester Archives. There is no clear-cut periodization of the development of public astronomy lecturing. I choose the period between 1817 and 1865, which marks the debut and the death of Deane Franklin Walker. This period also covers the rise and fall of the private astronomy lecturing trade, particularly theatre-based lectures during Lent. D. F. Walker was the last prominent member of the Walkers, a celebrated family of lecturers contributing to the transformation of the astronomy lecturing trade.\(^5\) However, the scientific milieu changed fast and the once-popular businesses had gone out of fashion. The change of laws surrounding Lent and theatrical performances also contributed to the demise of Lenten astronomical lectures.

Historical studies of ‘popular science’ and its agents have been a growing field in recent decades. Researchers view popular science variously as the popularization of scientific knowledge or as the representations of science in popular culture.\(^6\) Bernard Lightman distinguishes the popularizer from the practitioner: the former focused on conveying scientific knowledge, whereas the latter was engaged in original research such as conducting experiments and analysing natural worlds.\(^7\) The distinction is not meant to be rigid: some practitioners of science, such as John Tyndall, were also keen on popularization. Lightman, however, emphasizes a group of ‘non-practitioner popularizer’, who offered sensational science to the public yet their agenda often disagreed with the scientific elite’s.\(^8\) D. F. Walker and other figures discussed in this article also belong to the category of non-practitioner popularizer. Moreover, they can be further categorized into private and institutional lecturers. Private entrepreneurs operated independent lecturing businesses without affiliations to scientific establishments. In contrast, institutional lecturers were affiliated with or employed by literary and scientific learned institutions. The activities of private lecturers were different from those of their institutional counterparts. To analyse public astronomy lecturing in the context of the popularizer’s affiliation and the sites where they performed can help us to understand better the complexity of nineteenth-century popular science.
Notwithstanding the eventual decline of private entrepreneurs, I argue that public astronomy lecturing was a shared arena of private and institutional lecturers by the mid nineteenth century. My argument responds to two pioneering studies of the metropolitan lecturing milieu and popular astronomy by Jo N. Hays and Ian Inkster, respectively. Hays claims that scientific lecturing in London was decisively institutionalized by the 1820s: metropolitan lecturing scenes changed and became formalized. The institutionalization eclipsed private lecturers as well as prompting the professionalization of the men of science. Hays’s argument is based on the establishment of scientific institutions in the first two decades of the century and the increase of lecturers’ affiliation with those formalized bodies. Similarly, Inkster indicates an institutional transition happening in popular astronomy in the early nineteenth century, when academic men ousted old-school independent lecturers from the institutions. However, these observations do not give the whole picture. The growth of institutionalized science did not immediately overwhelm private lecturers in the market. The private astronomy lecturing trade continued to thrive until the mid century.

As Lightman warns that the demarcation between popularizers and practitioners should not be seen as being too rigid, the dichotomy between institutional and private lecturers is also porous and could be problematic. The first problem is the supposedly clear distinction between sites of scientific practice and performance. The former, such as learned societies and the Royal Institution, produce knowledge through conducting scientific research, experiment and innovation; the latter, including spectacles and museums, purvey knowledge to the broader public by entertaining display. However, institutions with a hybrid mix of innovative experiments and spectacular performance, like the Royal Polytechnic Institution, where sparks and the illusory extravaganza of ‘Pepper’s ghost’ were demonstrated, challenge our received demarcations. This dilemma over how to categorize a site into the scientific spaces is parallel to Lightman’s emphasis on the demarcation between popularizers and practitioners. Another problem is that of the extent to which the lecturer was affiliated to the institution. Lecturers might give courses elsewhere despite being formally associated with a particular institution. These ‘freelance’ institutional lecturers managed their businesses like those of private entrepreneurs. They hovered in a grey area of changing status.

The above potential problems reflect not only the practical difficulties of categorizing individuals and sites, but also the changing characters of science throughout the nineteenth century. What later came to be known as professional and popular science in the twentieth century and thereafter, as Lightman points out, were not in existence in the Victorian period. The terms ‘professional’ and ‘amateur’ did not indicate the distinction between insiders and outsiders of science for contemporaries, nor did the superiority in expertise or the hierarchy. The ambiguity concerning professional and popular science also relates to the spaces where science is conducted. Science in the nineteenth century was contested space, whether in a geographical or cultural sense, where groups and individuals shaped the identity of scientific practitioners and competed for the legitimacy of what counted as science in society.

There have been scholarly works focusing on the institutional or amateur practice of British astronomy in the nineteenth century, yet few have discussed the aspect of public astronomical lecturing. My study does not mean to analyse the professionalization of astronomical science. Rather, it provides a different perspective by looking at the diverse activity of astronomical lecturing. The actors presented in this paper, particularly private
lecturers, are often overlooked by historians in discussions of the transformation of nineteenth-century science. Nonetheless, these private lecturers are worthy of attention. Their various backgrounds, as stage actors, spectacle managers and itinerant showmen, are rich sources for recent scholarly interest in examining the performance, performativity and showmanship in the marketplace of science. Their agendas were often different from those of institutional popularizers. They could reach a great number of audiences, so their influence on the general public was not inferior to their institutional counterparts. Their lecturing sites were diverse and often located in venues other than ordinary sites of scientific practice, ranging from theatres to public houses. Such a variety of lecturing venues provide further examples of the performance sites in Victorian science. The different character of these spaces also invites researchers to consider how the space had distinctive effects upon astronomical lecturing according to the approach of geographies of scientific knowledge.

This paper first introduces the phenomenon of astronomy lecturing in the first half of the nineteenth century; the activities of London lecturers in the metropolis and the vicinity are particularly emphasized. Then I look at public lectures that took place in institutions for a comparison of institutional and private lecturing. Two representative figures, John Wallis (1788–1852) and George Henry Bachhoffner (1810–1879), are discussed as the institutional counterparts in the London lecturing market. The following section analyses the role of astronomical popularizers in the milieu of astronomical science in Victorian Britain. Lecturing sites were one critical indicator of the distinction between institutional and private popularizers. Spatial characteristics of the site also affected the performance of popular astronomy. Finally, I use the cases of two ‘artisan’ lecturers, John Bird (d. 1840) and Robert Children, to explore some of the reasons for engaging in the lecturing businesses. Making profits and raising social status from public lecturing were important motivations. The concept of self-improvement played important moral and economic roles in nineteenth-century astronomy lecturing.

THE PHENOMENON OF ASTRONOMY LECTURING AND PRIVATE ENTREPRENEURS

Public scientific lecturing in the nineteenth century was a kaleidoscope of discourse, instruction and entertainment. There was a splendid array of lectures in the marketplace, which formed a part of the cornucopia of amusements, spectacles and institutions in the metropolis. Astronomy was one popular subject among myriads of lectures. This phenomenon had been noticed by contemporaries, as a Chambers's Edinburgh Journal article remarked: ‘LECTURES on astronomy have for many years been highly popular with a large portion of the public’. Another example was a satirical newspaper cutting reviewing eight astronomical lecturers in London during the preceding Lent, which the journalist described as ‘The Astronomical Mania’. Astronomical lectures varied in quality and cost. From paying one guinea for a course of six lectures at the Royal Institution to half a shilling for the cheapest gallery seat in a West End theatre, audiences could find a lecture to meet their needs and pockets.

Astronomical lecturing in the early nineteenth century was a blend of convention and novelty. It was developed from the Enlightenment natural philosophy lecturing and instrument-making trades, so it inherited many conventional traits of these businesses. These traits included great emphasis on Newtonian science and instrument-oriented
demonstrations. Works by eighteenth-century lecturers, such as those of James Ferguson (1710–1776), were still influential in astronomical discourses. As for novelty, astronomical lecturing transformed into a new type of theatrical spectacle. The transformation was the use of theatrical facilities for creating scenic effects in front of a large theatre audience. It was initiated by Adam Walker (1730/31–1821) and William Walker (bapt. 1766, d. 1816), the father and the eldest brother of Deane Franklin Walker, in the last two decades of the eighteenth century. The Walkers invented and introduced the transparent orrery (Eidouranion), an optical or mechanical visual aid for the theatrical display of heavenly bodies, into astronomical lectures. Their success attracted other entrepreneurs to imitate the apparatus and lectures.

When Deane Franklin Walker took over his late eldest brother’s business in 1817, the London lecturing market was about to see a boom in astronomical lecturing within the next two decades. Figure 1 is a timeline of several astronomical lecturers in London and its vicinity in the nineteenth century which shows each lecturer’s approximate active period. This figure records the earliest and latest known lecturing dates or the year of the lecturer’s death, as derived from advertisements, newspapers and biographical accounts. It shows there was a period of growth during the 1820s and 1830s, when new entrepreneurs continued to enter lecturing ventures. Some lecturers did not stay in the business long, yet they still had an impact on the market. For example, George Bartley (1782?–1855), a
celebrated stage comedian, presented Lenten lectures on astronomy at the English Opera House. Bartley’s lectures received critical acclaim and were frequently mentioned by contemporaries, though his astronomical sideline was only staged for less than a decade.\textsuperscript{25} A few lecturers were active for a long period, such as Charles Henry Adams (1803–1871), who enjoyed over 30 consecutive years of lecturing at several West End theatres.\textsuperscript{26}

Astronomy lecturing was often a private venture, that is, lecturers managed and operated their own businesses independently. Private lecturers were not associated with scientific establishments and did not necessarily receive a formal education in astronomy. William Walker had received an education at Eton; however, like his youngest brother Deane, William’s expertise in science and public lecturing was likely acquired from his father. George Bartley was a professional actor in the theatre. C. H. Adams was a headmaster of a grammar school. The various backgrounds of these lecturers show that the astronomy lecturing trade had no formalized qualifications. The marketplace was open to any entrepreneur.

It was not uncommon that astronomical lectures were delivered outside the venues of scientific or literary institutions. Theatres were a favourite place among various sites where Walker, Bartley and Adams usually delivered their lectures. Despite mentioning some of these lecturers’ activities in theatres, Inkster and other scholars do not specifically consider theatres as a significant site for astronomy lecturing. However, the space of theatres could accommodate astronomical performances with splendid lighting and acoustic effects.\textsuperscript{27} Lectures inside theatres often rendered the beauty and sublimity of the universe with displays of the transparent orrery and moving transparencies (figure 2). This kind of astronomical show was a fixture during Lent, the approximately six-week period before Easter in the Christian calendar; because dramatic performances were restricted during Lent, theatres usually arranged alternative entertainments to replace regular plays, wherein astronomical lectures became a popular option, as the ‘Astronomical Mania’ article described.\textsuperscript{28} Lenten astronomical lectures often aligned with religious sentiments and narratives of natural theology, which was fashionable in early nineteenth-century Britain. The lecturing businesses were competitive. The ‘Astronomical Mania’ article named eight lecturers performing in London during the latest Lent, not to mention lesser-known lecturers who were not covered by the newspaper. These lecturers were all keen to persuade adults to bring children to theatres for ‘amusement and instruction combined’.\textsuperscript{29} The newspaper advertisements of the lectures of D. F. Walker, C. H. Adams and other people often appeared in the same column and the shows sometimes clashed.\textsuperscript{30}

Astronomical lecturers’ footsteps reached not only the metropolis but also provincial towns or the countryside. The Chambers’s Edinburgh Journal article from February 1847 also remarked: ‘[I]n the smaller provincial towns, the arrival of an itinerant lecturer, and the delivery of his “course of three,” illustrated by an orrery, was an event productive of general satisfaction, and served to enliven one or two of the dreary weeks of winter.’\textsuperscript{31} Metropolitan lecturers would regularly visit the provinces for guest appearances. In provincial towns or rural areas where there were no theatres, public venues such as assembly rooms or town halls were often used by travelling lecturers. For instance, D. F. Walker presented annual Eidouranion lectures in London during Lent and then travelled to different places during summer and winter. A poster shows that he lectured on the Eidouranion for two nights in the assembly room of the ‘Spread Eagle’ pub in Wandsworth in September 1820.\textsuperscript{32} Robert Children gave lectures in the town halls of Oxford and Sudbury, Suffolk, in November 1835 and April 1841, respectively.\textsuperscript{33} Such itinerant lectures were often advertised or briefly reported in the local newspapers.
As Allan Chapman points out, in small towns or the countryside there was a shortage of spectacles and entertainments, especially for the working classes. The sensational effect brought by these visual appliances on the nineteenth-century audience was not inferior to that of today’s cinema. Such crowd-drawing power would be more significant when the visitor was a famous one. When the Astronomer Royal George Biddell Airy paid a visit to Ipswich for a course of six lectures in March 1848, around 700 locals attended. Such attendances were quite significant as the population of Ipswich by 1851 was not over 27,000.

**Lectures inside scientific institutions**

Institutions and learned societies were important forces for promoting public lecturing. In London, scientific institutions aiming at a broad public burgeoned at the turn and the first decade of the nineteenth century, most notably the Royal Institution (founded in 1799) and the London Institution (1805). Outside the metropolis, similar literary and philosophical
establishments also grew fast and became the centre of local intellectual life. Another initiative was the Mechanics’ Institute, aiming at the working classes and thus offering relatively cheap charges of admission. For instance, an annual subscription to the London Mechanics’ Institution cost 24 shillings, around one fifth of the amount to the Royal Institution. The existence of multiple institutions in a city reflects not only a vibrant cultural life, but also potentially intense conflicts between different political or religious groups. Institutions could advocate certain views and represent members’ interests, thus appealing to particular audience groups.

Astronomy was also a well-developed lecturing subject in institutions. The Royal Institution, for example, had courses and lectures on astronomy, though it gave more attention to other subjects, such as chemistry or mechanics. Most of the lecturers who had given astronomical courses at the Royal Institution were external. However, they were a select group of prestigious men of science. These speakers included John Pond (1767–1836), Fellow of the Royal Society and later the Astronomer Royal, and Baden Powell (1796–1860), Savilian Professor of Geometry at Oxford (figure 3). Some academic men were also engaged in lecturing at provincial institutions. For instance, John Pringle Nichol (1804–1859), Professor of Astronomy at Glasgow, regularly delivered courses at the Royal Manchester Institution and the Sheffield Mechanics’ Institute. His lecturing topics included ‘Speculations concerning the Origin of the Solar System’, which alluded to the controversial nebular hypothesis.

Figure 3. Baden Powell’s lecture on ‘The rotation of the Earth’ at the Royal Institution from the Illustrated London News (17 May 1851). He exhibited several visual aids including diagrams, a globe and a Foucault pendulum in the lecture. The image is a cutting from a scrapbook (Royal Astronomical Society: Add MS 88: 55d). Courtesy: Royal Astronomical Society.
There were institutional lecturers who lacked academic positions. One significant, yet obscure, example was John Wallis. Wallis regularly delivered lectures at the Royal Institution; he gave a course to an adult audience in 1826 and three series of Christmas juvenile lectures in 1826, 1838 and 1846. His lectures were evidently popular. The average attendance at Wallis’s juvenile lectures in 1838 was 261 people, higher than at those given the next year at the Royal Institution by Professor of Chemistry William T. Brande (245). Wallis’s course at the London Mechanics’ Institution in 1826 was also expected to draw a great number of people, so the manager announced that each lecture would be ‘repeated on the succeeding Friday, in order that ... [the lectures would] not be too much crowded, and that every Member may obtain a favourable view of the splendid machinery and transparencies’. Another indicator of Wallis’s popularity was his tight schedule among different institutions. During the Christmas season in 1838, Wallis was engaged at the Royal Institution and meanwhile he also gave a course at the London Institution. These lectures even occurred on the same day—the Royal Institution’s in the afternoon and the London Institution’s in the evening. Perhaps because of his adequate lecturing quality and his relatively modest fees, institutions were pleased to employ him. Nevertheless, like other extramural lecturers without a formal appointment, Wallis still had to fight for lecturing opportunities and his proposals were not always successful.

George Henry Bachhoffner was another institutional lecturer whose astronomical lectures were popular in the mid century. Bachhoffner’s work on chemistry and electrical experiments has been explored by scholars, but little of his involvement in astronomical lecturing is known. He was a founding member of the Royal Polytechnic Institution and had been appointed as the ‘principal of the department of natural and experimental philosophy’ since its beginning in 1838. Bachhoffner left the Royal Polytechnic Institution in 1855 and played a chief role in a project of reviving the Colosseum at Regent’s Park, an iconic building that hosted panoramic paintings and other amusements. He became the manager and later the sole leasee of the Colosseum and added scientific displays into its repertoire. He had given astronomical lectures in both the Royal Polytechnic Institution and the Colosseum.

Institutional and private lectures differed in formats and subjects. Institutions usually offered a course consisting of several coherent lectures. For instance, the Royal Institution Christmas juvenile lectures delivered by Wallis in 1846–47 included six lectures; each was two hours in length (figure 4). The structure of the syllabus allowed the lecturer to elaborate a subject in detail. In contrast, private lectures, particularly those that took place in theatres, were usually a single event. They might be delivered more than once in a week or even for consecutive days, but each lecture basically repeated the same programme. A typical Lenten lecture on astronomy was two or three hours. Some Lenten lectures, like Walker’s, Bartley’s and Adams’s, had intermissions for presenting luxurious orchestral or choral music. These arrangements made Lenten lectures in theatres more like a spectacular show rather than a curricular discourse (figure 5). As for lecturing subjects, private lecturers usually followed conventional syllabi of Enlightenment natural philosophy lectures. The Walkers themselves were seasoned authors of natural philosophy monographs. Other lecturers, particularly those who were self-educated, often used (and sometimes copied) material from some popular works such as James Ferguson’s. The common subjects included the shape and motions of the Earth, the Moon, the Sun and eclipses, historical cosmological systems from Ptolemaic to Newtonian, and the planets and comets in the solar system. Institutional lectures also included the above descriptive topics, but more technical or mathematics-related aspects of astronomy, such as the instrumentation, calculation of time, gravitation and Newton’s laws, could be covered in the curriculum.
It is challenging to pinpoint the composition of the audience and its reception. The Royal Institution itself preserves relatively intact records of attendance and lists of subscribers. Other institutions, not to mention private entrepreneurs, might not have the fortune to keep relevant records. Therefore, surveys of the audience often rely on other, indirect accounts such as newspaper reports or the range of admission charges.\textsuperscript{56} Judging by its objectives and cheaper charges, for instance, the London Mechanics’ Institution had more people from the lower classes among the audience. The site and format of the lecture also affected who participated in the event. A Lenten lecture in the Haymarket Theatre could attract more people seeking entertainment than a course held in the Royal Institution. Nevertheless, we can still tell some similarities of the audience between institutional and private lectures. Youngsters, for example, were a common audience both institutional and private lecturers tried to woo. Historians have also noticed the common presence of women in scientific lectures.\textsuperscript{57} The participation of children and women can be interpreted as indicating that science had entered the family circle for the use of moral education and ‘familiar’ object lessons.\textsuperscript{58}

**THE ASTRONOMICAL COMMUNITY, SITES AND PERFORMANCE**

One characteristic of nineteenth-century popular astronomy was the diverse background of the popularizers. Lecturers, whether independent or connected to institutions, did not necessarily have astronomical expertise or experience. There was no consensus on
qualification; that is, a formalized procedure for training a person to be eligible for public lecturing on astronomy. What place did these astronomical lecturers locate in relation to the astronomical community? To discuss their identities, it is necessary to clarify the milieu in which British astronomy worked in the nineteenth century.

Unlike the Continental European mode of a state-conducted, centralized governing body employing university-trained professionals, astronomy in Britain had kept a strong ‘Grand Amateurs’ convention.59 As Allan Chapman indicates, adequately paid astronomical positions were few and far between in Victorian Britain.60 Those influential Grand Amateurs in astronomical circles were private and independent players. To support their astronomical pursuits, some of them had another profession or business, others amassed a fortune from inheritance or marriage. For instance, incomes from their original jobs

Figure 5. Playbill of C. H. Adams’s Lenten lecture at the Haymarket Theatre, London, from the Theatrical Observer (27 February 1839).
enabled Francis Baily (a stockbroker), James South (a surgeon), William Lassell (a brewer) and James Nasmyth (a mechanical engineer) to indulge their interest in astronomy. John Herschel benefited from his family’s fame and fortune; Lord Rosse was a Member of Parliament and inherited a peerage before he built the famous six-foot telescope. These Grand Amateurs had private resources to manage their own observatories and instruments. They conducted independent researches on novel phenomena while their livelihood did not depend on stargazing. The Royal Astronomical Society, the dominant establishment where many Grand Amateurs were active, was a clearing house of independent enthusiasts rather than a state-conducted centralized institution. Most of the executive members in the early Society, including the first acting secretary, Baily himself, were ‘professionally oriented people’ such as bankers, lawyers and merchants. An ethos of efficient management was introduced into astronomical practice by these ‘business astronomers’, as William Ashworth calls them, through the establishment of standardized tables, accurate accounting and refined bookkeeping. George Biddell Airy, who lived solely on the incomes from the Astronomer Royal post, was a rare case among leading men of astronomy. Because of Airy’s extensive involvement in public services, governmental businesses and the renovation of Greenwich Observatory’s infrastructure, historians describe him as a ‘scientific civil servant’. Other directors of public or university observatories usually had additional clerical or academic duties to provide their main income.

Salaried assistants hired by individuals or observatories were another important workforce in British astronomy. Observatories, whether private or public, needed assistants for maintaining day-to-day operation. The Greenwich Observatory was the most prestigious employer in this job market. Aside from six senior warrant assistants, Greenwich employed and trained a few middle-class lads as ‘Supernumerary Computers’ to do routine calculation or observation work. This supernumerary system was described as a ‘band of scientific clerks’ by a contemporary journalist. Nonetheless, the positions of assistantship were few in the whole country; the career prospects of these professional assistants were also limited. They were usually ‘invisible’ in the forum of Grand Amateur science and very few of them could rise to a socially recognized executive rank.

Wallis and Bachhoffner, along with private lecturers such as D. F. Walker, had seldom or never been involved in the astronomical community described above. They were neither Grand Amateurs, nor business astronomers, nor professionals who worked for observatories. None of them had affiliation with astronomical establishments such as the Royal Astronomical Society. Bachhoffner was a fellow of the Chemical Society of London and a member of the short-lived London Electricity Society. Wallis might have engaged in some astronomical observation in his spare time, but the records were few. Their involvement in astronomical science focused on public lecturing rather than conducting innovative research or routine observation. This practice distinguished them from most practising astronomers. Grand Amateur and business astronomers were not dependent on public lecturing for supporting their livelihoods and researches. They would give addresses or lectures to institutions, as Herschel did to the meetings of the British Association for the Advancement of Science, or as Airy did at the Royal Institution and in Ipswich, but these occasions were not on a regular or commercial basis. In contrast, lecturing was a business or a vocational pursuit to people like Wallis and Bachhoffner. They made profits from delivering public lectures.

The above analysis shows that a large group of nineteenth-century astronomical lecturers, whether institutional or private, belong to the popularizers who were not scientific
practitioners according to Lightman’s distinction. It is difficult to use a simple dichotomy between the amateur and the professional to classify them. Rather than be constrained by conventional models of professionalization or disciplinary formation, historians increasingly view nineteenth-century science as contested space in both cultural and geographical aspects. Various practitioners competed for legitimate purposes and to establish a code of conduct in science, where they were active in different sites and places. Similarly, within this context, Ashworth claims the establishment of the Royal Astronomical Society was to ‘narrow and define the science’s boundaries’. Business astronomers differentiated themselves from other practitioners and old regimes such as the Royal Society through their new emphasis on ‘precise measurement and systematic calculation’. Popularizers in the lecturing trade can be seen as a group of alternative ‘practitioners’ in the marketplace of astronomy. They responded to the public demand for astronomical lecturing and amusement while business astronomers put measurement and calculation into practice to serve research and business interests.

The distinction between venues used by private and institutional lecturers also leads us to reconsider how different sites and their spatial characters affected lecturing. When referring to scientific institutions in early nineteenth-century Britain, historians often indicate those built on the Royal Institution or Mechanics’ Institute models, and to encompass Enlightenment-style philosophical or specialized learned societies. In addition, Hays also includes pedagogic sites offering formalized training, such as the London University and a few hospitals with medical schools. Hays’s judgement about the drastic institutionalization of the London scientific lecturing trade in the 1820s is also due to his focus on these sites of scientific practice. However, there were a number of sites which blended scientific and technological curiosities with sheer entertainment, especially in the metropolis. Unlike laboratories or observatories, these sites were not a prescribed place for scientific inquiry and the production of knowledge. Instead, they provided performances, that is, as Iwan Morus indicates, ‘making science and its products visible, pulling in the crowds and amazing them with nature’s wonders’. The Colosseum, the Adelaide Gallery, the Great Exhibition of 1851 and numerous spectacles and museums in London were among these performance sites. The Royal Polytechnic Institution was, particularly, the epitome of the institutionalized performance site. Its eye-catching displays of optical wonders and electrical curiosities were a part of the business combining invention and showmanship.

Astronomical lectures often took place in the above performance sites. These lectures had to accommodate the expectations of the audience. Spatial qualities of the performance site could also fulfil sensational effects those lecturers and spectators wanted. Lenten lectures inside theatres were an apparent case of exemplifying this spectacular aspect. As figure 2 shows, those giant transparencies, orreries and other pieces of apparatus on the stage were purposely made for displaying heavenly scenes in front of a large audience. They gave a strong visual impression to the viewers, and were better performed in a dark environment with a theatre’s distinctive lighting. Besides, lecturers would also interweave implicitly religious sentiments into their narrative. Thus, these lectures were made not only scientifically instructive but also morally educative. As a contemporary writer commented:
marked reverence . . . Adults, as well as children, will derive . . . an increased perception of the power, dignity, and ubiquity, of that Being whom we ought to serve. 75

We can see that popularizers adapted astronomical lectures to suit the theatrical space and cultural norms of Lent. In comparison with the scene of a typical institutional lecture shown in figure 3, Lenten lectures spoke of a different kind of astronomy, which appealed beyond a clearly simplified expression of elite scientific knowledge for wider audiences. This is not to say that lecturing in conventional institutions dismissed performance at all. Historians have regarded performance in science with various functions such as building trust and generating consensus, as shown by the demonstrations of experiments in the early Royal Society. 76 Comparisons between private and institutional lectures demonstrate the richness of visual and verbal content used by popularizers in different sites and occasions. 77

THE PROSPECT OF PROSPERITY AS A LECTURER

What motivated numerous people to enter the astronomy lecturing business? Studies of nineteenth-century popular science publishing pay great attention to the political or religious agenda behind the popularizers. The cases that scholars have examined include the publications of the Society for the Diffusion of Useful Knowledge, which coincided with the Whig ideal of social reform, 78 the explorations of natural theology in the Bridgewater Treatises and the works conducted by the evangelical Religious Tract Society. 79 Astronomy was an unrivalled subject to evoke imagery and sentiment of the sublime, hence religious rhetoric was common in popular astronomy writings or lecturing. Nevertheless, it does not necessarily mean that lecturers had a particular religious agenda. The prospects of making profits and promoting status were two important motivations for engaging in astronomy lecturing.

Successful lecturers from a humble working-class background exemplify the prospect of prosperity one could expect to gain in the lecturing business. One representative figure was John Bird (d. 1840), 80 whose lecturing career started after 1814. Before 1814, probably when in his early twenties, Bird was a journeyman carpenter in Abingdon, Berkshire. Despite lacking a formal education, Bird made astronomical instruments such as a tellurian, the device to demonstrate the tilted rotation of the Earth, by the help of ‘an old print on a leaf of Ferguson’s Astronomy’. 81 After the encouragement of an unnamed patron and a successful exhibition of his instruments at the town hall, Bird abandoned his carpenter’s trade and found a vocation in lecturing. The story of a genius with humble origins interested journalists, as two magazines reported:

An extraordinary instance of innate scientific genius has been lately evinced in the person . . . Bird, who, less than a twelvemonth since, followed the humble occupation of a journeyman carpenter . . . He has since delivered lectures, with astonishing perspicuity, in the principal towns of Berkshire, Wiltshire, and Somerssetshire. 82

By the 1820s John Bird had already become a well-established private lecturer. He was employed to lecture in public schools including Charterhouse, Westminster and Eton. 83 Judging by the relatively high admission charge (3 shillings for each lecture, which was equal to the price of a box seat in a West End theatre) of Bird’s courses at Charterhouse, he must have had a wealthy audience. Bird enjoyed fame in the aristocratic circle as the
astronomical preceptor of the Marquis of Douro, the eldest son of the Duke of Wellington, and also received the patronage of King William IV. A posthumous biography in the Leisure Hour describes Bird thus:

He certainly had little learning; his qualifications consisting in reverent admiration for, and enthusiastic ardour in pursuing and illustrating, astronomical truths. Moreover, he possessed an inventive mind, a retentive memory, genuine natural humour, versatility, and readiness. There was, however, a want of refinement in his speech and manner. Still, notwithstanding these drawbacks, in those days his capacities were sufficient to insure him the reputation of a public favourite. His lectures were always extemporaneous ... Mr. Bird, in truth, raised a host of imitators, though none of them possessed the originality of his mind. 

In terms of the patronage, Bird followed the traditional pattern of instrument-makers and astronomers who were autodidacts, such as George Adams (ca 1709–1772), James Ferguson, William Herschel and so on. They were all of obscure origins, established a good reputation by the virtues of their crafts and expertise, and eventually acquired royal patronage. 

Bird’s success directly inspired Robert Children, who was originally a small-scale master bootmaker in Bethnal Green, London. After attending a lecture delivered by Bird some time around 1835, Children began to develop his own lecturing business. Like Bird, in the beginning of his career Children had to overcome many problems, including illiteracy, bad pronunciation and ignorance of specialized knowledge. Nevertheless, he persevered and survived in the market. The Hampshire Advertiser cited a paragraph from the Oxford University Herald of 28 November 1835 to report Children’s lectures in the town hall of Oxford, which were ‘well attended, particularly those in the morning given at the request of several of the heads of Colleges’. The Essex Standard also acclaimed Children’s lecture in Sudbury in 1841, which was under the patronage of the mayor and an Anglican minister. It made the criticism that most scientific lecturers failed to impart knowledge to the audience, but this was ‘not the case with Mr. Children’:

Without any pretensions to the higher flights of oratory, Mr. Children, in easy and familiar language, explained the wonders of heavenly bodies, and illustrated his subject with such a variety of transparencies, and an ingeniously-contrived mechanical apparatus, constructed by himself, on a new and improved principle, that his most difficult theories must have been understood even by a mind not previously turned to the consideration of astronomy.

Children’s success in the lecturing business made him quit his original boot-making trade. He eventually acquired a fortune of £6 000 from astronomy lecturing and retired as a ‘great farmer’ in America.

The cases of John Bird and Robert Children exemplify not only the potential prosperity of the private lecturing trade, but also the value of self-improvement. Self-improvement was a recurring concept frequently addressed by Victorians. An individual could improve knowledge, morals and faith by industrious self-learning and make a better, more useful life from it. Cultivation of science was deemed to make good use of the divine gift of reason, and was a ‘dignified means of excluding those modes of abusing time which are the sin and disgrace of many young persons’. Besides, self-improvement also encompasses the virtues of hard work and perseverance, along with the prospect of
consequent rewards. The success of Bird and Children is similar to the famous story of Michael Faraday, who transformed himself into a recognized man of science from a humble bookbinder’s apprentice. Their cases all reflect the climb from a lower social status to a better vocation with erudition, respectability and material prosperity.

CONCLUSION

Private entrepreneurs were a significant group of popularizers in the marketplace of public astronomy lecturing. Their ubiquitous errands across the metropolis and provinces were common scenes in early nineteenth-century Britain. Some successful lecturers, such as D. F. Walker and C. H. Adams, enjoyed prominence. They could reach a great number of audiences. Audiences regarded them as legitimate presenters of astronomical knowledge despite their lack of institutional affiliations. For people who were from lower social classes, like John Bird and Robert Children, astronomy lecturing was a potentially lucrative venture to gain better income and social status.

Institutional lecturers, such as John Wallis and George Bachhoffner, co-existed with private entrepreneurs in the marketplace. Because institutions did not emphasize the aspect of spectacle to the extent that performance sites did, institutional lectures were distinct from private ones in format, style and subjects. An institutional lecturer of astronomy, however, was not necessarily an astronomical practitioner working on or supporting research. Although Wallis and Bachhoffner were employed by scientific institutions to deliver astronomical lectures, neither of them was involved in the circles of Grand Amateur astronomers or professional observatory staff. Rather, their trait fit better the category of the ‘non-practitioner popularizer’ as identified by Lightman.

Nevertheless, we should keep in mind that the boundary between institutional and private lecturers was not impermeable. Lecturers could move from one category to another from time to time. When Bachhoffner left the Royal Polytechnic Institution and became the sole proprietor of the reopened Colosseum, his lecturing business could be seen as being private and independent. D. F. Walker, though he mostly lectured outside scientific establishments, had given lectures at a Mechanics’ Institute at least once, in Bristol in 1830.92 The categorization of institutional or private lecturers is a convenient means to analyse the milieu of the astronomical lecturing trade, yet it is not an absolute line of demarcation.

Before the mid century, although institutional agents increasingly eroded the space of private entrepreneurs in the market, the public astronomy lecturing trade remained a shared arena for both institutional and private lecturers. Hays claims that scientific lecturing in London was decisively institutionalized by the 1820s, for various scientific institutions became established and tried to consolidate formalized discourse. However, Hays underestimates the persistence of private entrepreneurs, because he emphasizes the pedagogical spaces providing public lectures or collegiate education rather than the performance sites later identified by historians. Theatres, along with other spectacles, were one of the performance sites neglected by Hays. Private lecturers remained active in the performance sites and new entrepreneurs continued to enter the market. The success of later entrepreneurs like C. H. Adams indicates that the prosperity of private lecturers did not fade away until the mid century.

The obituary of D. F. Walker, as the beginning of this article shows, marked the end of an era: a time when autodidact entrepreneurs lectured on astronomy with their curious apparatus
in theatres or public places countrywide. The Walkers had epitomized such astronomical popularizing since the late eighteenth century. Around the time when D. F. Walker’s apparatus was advertised for sale, many other once-celebrated lecturers also faded from the stage. C. H. Adams had taken his last bow after a lecturing career of 30 years; Bachhoffner was no longer the manager of the Colosseum. The fashion of Lenten astronomical performances had gone; the transparent orrery and its display of the heavens were less and less noticeable in the public sphere.

The cause of the eventual decline of the private lecturing business after the mid century is still not certain. Aside from the looming shadow of institutionalized science, the lift of the ban on regular plays in theatres during Lent was perhaps a powerful trigger. By the 1860s, the Lenten restrictions gradually loosened and to a large extent had been lifted. Therefore, the initiative for astronomical lectures as an alternative to regular plays during Lent was gone. Besides, conventional Lenten astronomy lectures faced a more severe challenge from new entertainments, such as music halls, which provided a wider range of variety shows and grew rapidly after the mid century. While choices of amusements increased, Lenten astronomical lectures probably lost their entertaining as well as educational appeal to audiences, owing to their out-of-date performance. Richard Altick indicates that the environment of London entertainments changed much in the mid Victorian era, a transition which he calls the ‘post-Crystal Palace era’. Not only Lenten astronomical lectures, but also many other types of shows were on the wane. Altick claims that the Great Exhibition of 1851 and later state-funded museums and galleries on the South Kensington model changed the landmark of educational leisure life. Private lectures and exhibitions run by one-man entrepreneurs could not beat the new type of ‘institutionalized’ recreation, which was superior in the range and scale of exhibits.

The demise of Lenten astronomical lectures and old-school entrepreneurs did not mean the end of private astronomy lecturing. Independent astronomical popularizers, such as Richard Anthony Proctor (1837–1888), Arthur Cowper Ranyard (1845–1894) and Agnes Mary Clerke (1842–1907), remained active in writing or lecturing in the last decades of the nineteenth century. However, their connections to an institutionalized science network were much stronger than the last generation of private entrepreneurs. Both Proctor and Ranyard were university graduates and Fellows of the Royal Astronomical Society. They first established their credentials as practising astronomers and later earned their livings as editor, popular author or lecturer. Clerke, despite a lack of formal education, enjoyed friendly relations with practising astronomers. Her contributions to popular writing were later celebrated by the Royal Institution and the Royal Astronomical Society. Non-practitioner popularizers of the old school, whether the Enlightenment natural philosophy lecturers like D. F. Walker or self-taught artisan entrepreneurs like John Bird, had lost their place in an institutionalized and specialized world of science. The scenes of public astronomy lecturing after the 1860s were quite different from the marketplace before.

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NOTES

1 Athenæum, 15 July 1865, p. 65.
3 ‘Mr. Deane Walker’, Gentleman’s Mag. 2(July), 113–114 (1865), at p. 113.
5 For the Walkers and the development of the transparent orrery, refer to Henry King, Geared to the stars: the evolution of planetariums, orreries and astronomical clocks (University of Toronto Press, 1978), pp. 309–315. See also Jan Golinski, ‘Sublime astronomy: the Eidouranion of Adam Walker and his sons’, Huntington Libr. Q. 80, 135–157 (2017); Huang, ibid., pp. 48–52.
8 Ibid., p. viii and p. 489.

16 For a representative work on this subject, see Allan Chapman, The Victorian amateur astronomer: independent astronomical research in Britain 1820–1920 (Wiley-Praxis Publishing, Chichester, 1998).


21 The cutting is from an unspecified newspaper dated sequentially to around 1839; op. cit. (note 16), p. 167.

22 Inkster, op. cit. (note 10), at pp. 121–123; Chapman, op. cit. (note 16), pp. 165–179; Huang, op. cit. (note 4), pp. 59–61, especially see admission charges in Table 1.


28 For Lenten restrictions on theatres and dramatic performances, see Altick, op. cit. (note 11), p. 364; Richard Foulkes, Church and stage in Victorian England (Cambridge University Press, 1997), pp. 32–34.

29 Quoted from John Hollingshead, ‘At the play’, Cornhill Mag. 5, 84–92 (1862), at p. 89.

30 ‘Public amusements’, Morning Chronicle (25 March 1837); ‘Public amusements’, Morning Chronicle (4 April 1838); ‘Easter amusements, &c.’, Illustrated London News (11 April 1857), at p. 337.

46 ‘Royal Institution of Great Britain: MS LE’, vol. 2, pp. 110, 127 and 142.
Wallis’s lectures at the Royal Institution were on 27 and 29 December 1838 and 1, 3, 5 and 8 January 1839, while his lectures at the London Institution were on 17, 20, 24, 27 and 31 December 1838 and 3, 7 and 10 January 1839. See the advertisement in the *Morning Chronicle* (5 November 1838); ‘Royal Institution of Great Britain: MS LE’, vol. 2, p. 127.

Wallis’s pay refers to Hays, *op. cit.* (note 9), pp. 98–99. The London Mechanics’ Institution paid Wallis 27 guineas for six lectures during the 1830s. He received a higher pay (40 guineas for six lectures) from the London Institution.


For further discussion of Bachhoffner’s astronomical lecturing, see Huang, *op. cit.* (note 24), pp. 57–68.

Victorian contemporaries made the same observation of the contrast between British and Continental European institutions of science; for example, see Edward Bulwer-Lytton, *England and the English* (J. & J. Harper, New York, 1833), vol. 2, pp. 122–130.

For Lord Rosse’s family, public life and astronomical career, see articles collected in Charles Morlan (ed.), *William Parsons, 3rd Earl of Rosse: astronomy and the castle in nineteenth-century Ireland* (Manchester University Press, 2014).

William Ashworth, ‘The calculating eye: Baily, Herschel, Babbage and the business of astronomy’, *Br. J. Hist. Sci.* 27, 409–441 (1994). The aspect of ‘business astronomers’ discussed by Ashworth is different from Grand Amateurs described by Chapman. The former term emphasizes a group of people who reformed positional astronomy through asserting disciplined practice into the science, whereas the latter were independently wealthy practitioners and often built large telescopes to explore new phenomena; there are some overlaps between the two groups.


Frederick Knight Hunt, ‘The planet watchers of Greenwich’, *Household Words* 9, 200–204 (25 May 1850); *op. cit.* (note 16), pp. 146–157. See also Mary Crokren, ‘Astronomical labourers:

65 The concept of the ‘invisible technician’ was coined by Steven Shapin and has been widely used by other historians, such as Richard Sorrenson on eighteenth-century instrument maker George Graham. See Steven Shapin, ‘The invisible technician’, *Am. Sci.* **77**, 554–563 (1989); Richard Sorrenson, ‘George Graham, visible technician’, *Br. J. Hist. Sci.* **32**, 203–221 (1999).


67 A letter read in a meeting of the Royal Astronomical Society shows Wallis had observed an occultation of Saturn in 1825; ‘Proceedings of learned societies’, *Monthly Mag.* **60** (January), 68–70 (1826), at p. 69.


70 Ashworth, *op. cit.* (note 62), at p. 412.


74 Michael Faraday had indicated the advantage of theatre lighting for Walker’s astronomical lectures; James, *op. cit.* (note 54), p. 56, Letter 23.


78 Secord, *op. cit.* (note 40), pp. 48–51.


80 Not to be confused with the instrument maker John Bird (1709–1776), who was born in Bishop Auckland, County Durham. There is no evidence that they were related.

81 ‘A lecturer of the old school’, *Leisure Hour* **95** (20 October), 676–678 (1853).

George Adams and his son, George Adams junior, were both the mathematical instrument maker to King George III. James Ferguson had received an annual pension of £50 from King George III since 1761. William Herschel was appointed as the King’s astronomer after his discovery of Uranus.


Astronomy, *op. cit.* (note 33).

Sudbury, *op. cit.* (note 33).


‘Lecture on astronomy’, *Bristol Mercury* (2 November 1830).

The last known C. H. Adams’s lecture took place in the Lyceum Theatre in 1861; ‘Mr. Adams’s orrery’, *Standard* (27 March 1861); ‘Amusements of Passion Week’, *Era* (31 March 1861).

The lease and management of the Colosseum changed some time in 1863; ‘Music and dance licences’, *Era* (11 October 1863); ‘The London exhibitions, &c.’, *Era* (3 January 1864).

See: ‘Royal Polytechnic’, *Theatrical J.* 32 (15 March 1871), p. 81, it mentions that the Lenten ban on dramatic performances on Wednesdays and Fridays was no longer being enforced.

