

Sir Robert Ball: Victorian Astronomer and Lecturer *par excellence*

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Between 1875 and 1910 Sir Robert Stawell Ball gave an estimated 2,500 lectures in towns and cities all over the British Isles and abroad. This paper traces his lecturing career from its beginnings in Ireland to the triumphs of the Royal Institution, and on lecture tours in the United States of America. After a period in mathematics and mechanics, he became a populariser of science, especially astronomy, and found fame, and fortune among the working classes and the aristocracy. What motivated him to tireless travels is uncertain, but it might have been that it was rewarding, financially and to his reputation. Whatever his motives, contemporary accounts are clear that Ball's lectures were extremely popular and well-received.

Members of the Society for the History of Astronomy will know that on 30 April 2005 the Society's reference library at the Birmingham and Midland Institute (B.M.I.) was officially opened, and named after Sir Robert Ball (Figure 1)¹. The library was dedicated to him as he was involved with the B.M.I. for more than 30 years, and lectured there on numerous occasions during the late Victorian era. He will, of course, be remembered by everyone interested in the history of astronomy for his many popular books, such as *The Story of the Heavens*. However, it is his lectures in popular astronomy that are the topic of this paper².

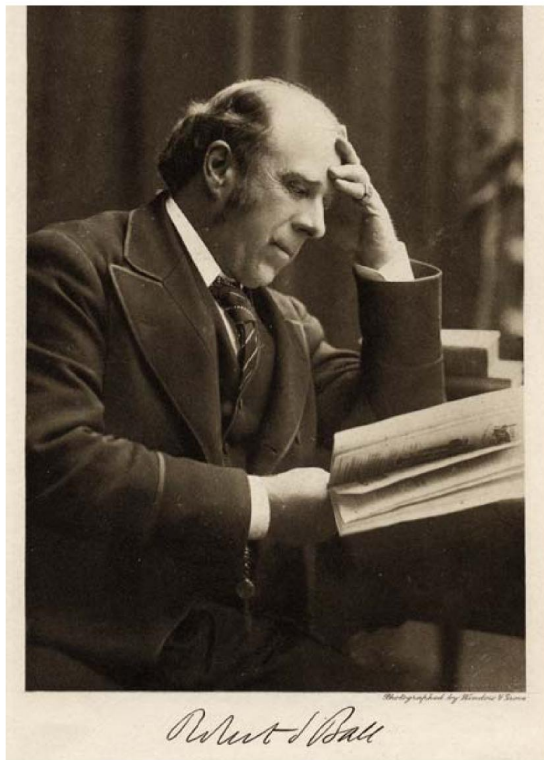


Figure 1

Sir Robert Ball circa 1900

Image taken from *Reminiscences* (Reference 2).

Born in Dublin in 1840, Robert Stawell Ball attended Trinity College, Dublin, where he had a brilliant university career, winning a scholarship and gaining honours in mathematics and experimental physics³. He graduated in 1865, but nearly a decade passed before he became a professional astronomer. He was influenced early on by many books, especially *Orbs of Heaven*⁴ by Mitchell. After graduating he spent two years as tutor in the classics to the sons of the Earl of Rosse at Birr Castle, where he also took charge of the Earl's 72-inch reflector (Figure 2), thus getting his first practical experience in astronomy.

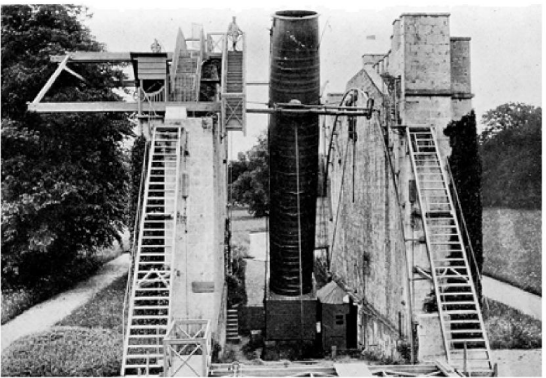


Figure 2

The 72-inch telescope of the 3rd Earl of Rosse

Image taken from *Reminiscences* (Reference 2).

In 1867 the Government of Ireland established in Dublin the Royal College of Science, and Ball spent seven years there as Professor of Applied Mathematics and Mechanism. Then, in 1874, he applied for, and obtained, the position of Andrews Professor of Astronomy at the University of Dublin, and was also appointed as Royal Astronomer of Ireland and Director of the Dunsink Observatory. In 1886 he was honoured with a knighthood for his contributions to science. By 1892 Ball had held the

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three posts for 18 years, and was 52 years of age. He had a growing family to support; his salary in Ireland was not great; and he believed he could do much better in England.

A vacancy at Cambridge University, following the death of John Couch Adams⁵, was Ball's chance to advance his career and his status in the scientific world. His application for the vacant Lowndean chair of Astronomy and Geometry, was successful, and in a letter to his mother he pointed out that it was:

'The highest scientific chair in England, if not in Europe, the Solar System, no ... the Milky Way, indeed the highest in the whole Universe.'⁶

One might have expected great things from Sir Robert following his arrival in Cambridge. No doubt much scientific work was done during Ball's tenure, but very little has been written about his involvement in any major discoveries. His duties as Lowndean Professor required him to be in attendance for only five months of the year, and much of that time would have been taken up in tutoring. So he had plenty of spare time to follow other, more lucrative pursuits. But how did he get started on this climb to 'the highest of scientific chairs'?; and why did he devote so much of his time to lecturing?

To discover the answers we must go back to the autumn of 1859. The members of the Dublin Philosophical Society⁷ were assembled for one of their monthly meetings. They could not have guessed that the young undergraduate about to give his very first talk to the students of Dublin's Trinity College, would go on to become one of the Victorian era's greatest lecturers.

However, it was to be another 10 years before he gave his first lecture to a paying audience. This was at the Athenaeum⁸ in Belfast on 4 February 1869, and was entitled *Some Recent Astronomical Discoveries*⁹. For this lecture he earned the sum of 14 shillings; he was offered more, but declined, saying he was happy just to recoup his expenses. As we shall learn, in later years he was not so generous.

A few weeks after his Belfast lecture, he was invited to address the Royal Dublin Society at their afternoon lectures. He drew on his experiences at Birr Castle, and expounded on *Nebulae*, as seen through the 72-inch telescope, known as the Leviathan of Parsonstown. He illustrated his talk by showing the audience an enlarged copy of the magnificent engraving of the Orion Nebula, made from a drawing that Lord Rosse had painstakingly made over many years (Figure 3). Ball enlightened his audience that afternoon by telling them that nebulae were so far away that if one of them were to be immediately struck from existence by an omnipotent force, posterity for many generations may still observe, measure and draw the object long after it ceased to exist!



Figure 3
Drawing by the 3rd Earl of Rosse
of the Great Nebula in Orion

Image taken from an engraving by James Basire (1796-1869).

Soon after Ball left Birr Castle in 1867 he came across the book *A System of Apparatus for the use of Lecturers and Experimenters in Natural Philosophy*¹⁰, by the Rev. Robert Willis, Professor of Mechanics at Cambridge. Ball made good use of the book and of the Willis apparatus¹¹ in his lectures to students on experimental mechanics; little did he realise that it was to later set him on the path to his true vocation as a populariser of science. Ball's first venture in book authorship arose from him using the Willis apparatus. Macmillan & Co. agreed to publish a book¹² based on the demonstrations (Figure 4). Although itself not a best-seller, it prompted several enquiries, the most important of which came from the B.M.I.¹³

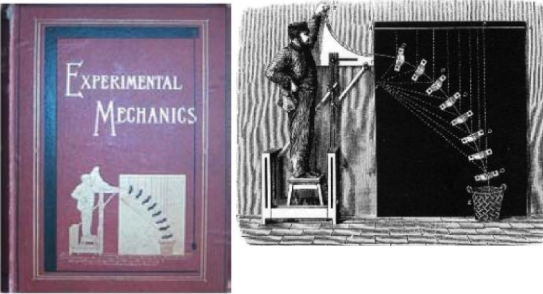


Figure 4
Ball's first book, published in 1871

The image on the right shows an apparatus for proving that 'the path of a projectile is a parabola'. It is taken from page 251 of the book.

This enquiry, in the summer of 1874, included a request for Ball to lecture at the B.M.I. on mechanics, and came at a time when he was making a career change. He had only just been appointed to the three senior astronomy posts in Ireland. He was unsure that he should be lecturing on mechanics at a time when he had decided to devote his time and

energy to astronomy. Not easily dissuaded, Mr Cresswell, the B.M.I. Director in charge of the lecture department, suggested to Ball that he should spend a week in Birmingham, give two public lectures on astronomy and between times, teach the staff at the Institute all he could about the Willis apparatus. Ball agreed, and this event started him on the road as a public lecturer on astronomy. The subject of his first B.M.I. lecture in 1874 was the great astronomical event of that year, the transit of Venus. He prepared many diagrams and slides, including one showing how the Earth revolves around the Sun eight times to Venus's thirteen¹⁴. He quoted the work of Halley, gave details of the 1769 transit expedition of Captain Cook to the South Seas, and explained why the next series of transits would not occur until the beginning of the next millennium: 'until the flowers are blooming in the June of 2004'. His other astronomy lecture at the B.M.I. that week was *A Night at Lord Rosse's Telescope*. Never one for resting on his laurels, whilst in England he also visited Hanley and lectured to the Potteries Mechanic's Institute, and at Gloucester, before returning to Dunsink, successfully complet-

ing the first of his lecture tours. By 1880 Ball had been at Dunsink for six years, and had a full grasp of his subject, as can be seen from a syllabus from Trinity College, Dublin (Figure 5).

Ball always seemed to find the time to get away from Dunsink and to travel to England, where he was to become a regular visitor to the Midlands and to the B.M.I. in particular. He had the honour of giving the inaugural lecture at the B.M.I.'s new hall, when it opened on 24 October 1881. The lecture was called *A Glimpse through the Corridors of Time*, and it was a resounding success. It was immediately put into print and published in two parts in the journal *Nature*¹⁵, which sold out both issues on the strength of it. It was also published in pamphlet form by Macmillan & Co. in 1882¹⁶, and generated a fair amount of correspondence for Ball, as some of his statements about the 'time and tides' controversy met with disagreement. Ball was talking about a time when:

'... the earth spun round in a few hours and the moon was quite close to it; it is not difficult to imagine how the earth and moon were originally one body.'¹⁷

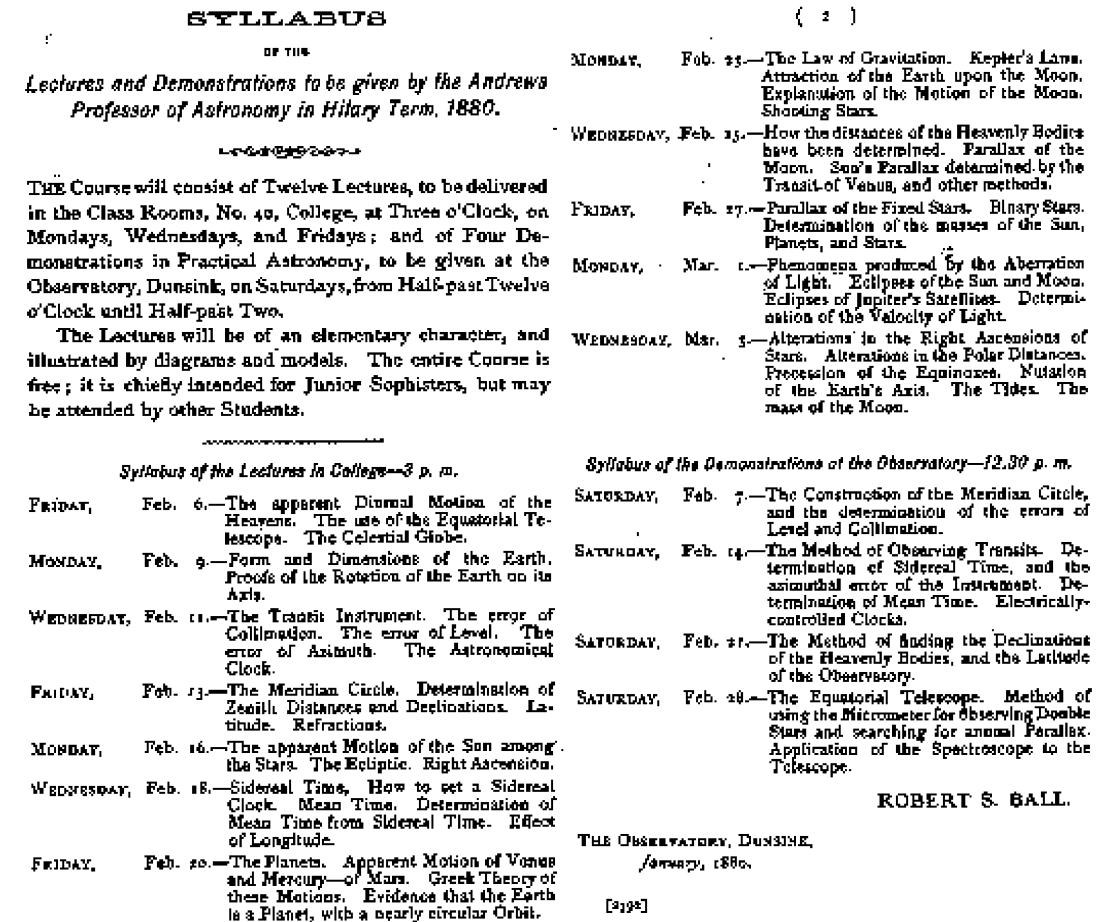


Figure 5
Syllabus of Ball's lectures and demonstrations, Hilary Term 1880, Trinity College, Dublin

Image taken from Reference 18.

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One of his close friends, Sir George Darwin, did not entirely agree with him, though Professor George Minchin, the famous geologist, said:

'I cannot refrain from calling your Birmingham lecture a singularly beautiful and instructive one ... The whole story is the most wonderful imaginable.'¹⁹

In 1891 Ball was elected President of the B.M.I. The subject of his Presidential address was spectroscopy, and entitled *The Movement of the Stars*. He enthralled his audience with the very latest advances in the subject, ending his address with the very apt phrase: 'Let there be light'.²⁰

It was in 1880 that he began a fruitful relationship with the Gilchrist Trust, a charitable body, part of whose remit was to provide lectures throughout the British Isles, particularly in smaller towns. The lectures were always science based, and the previous lectures on astronomy were given by Richard Proctor. In late 1879, the Gilchrist Trust approached Ball with news that Proctor was about to embark on a world lecturing tour²¹. Ball agreed to take his place in the Trust's event, and his first Gilchrist tour in 1880 took him to Lancashire and Yorkshire; to the towns of Rochdale, Accrington, Huddersfield, Preston and Bury²². The Gilchrist tours suited Ball - he was able to leave the Trust to organise them. All he had to do was turn up at the venue some twenty minutes before the start, to set up his slides, etc. He almost always lectured to packed houses; the Trust would arrange 800-seat venues wherever possible.

The Gilchrist Lectures were for working-class audiences²³, and in the early years, local dignitaries worried that they would be poorly attended. Ball recounted that on his first visit to Blackburn the Mayor was very concerned that there would be a poor turnout. To make matters worse, it was raining heavily and getting worse. On reaching the hall, in the torrential rain, not a soul was to be seen, with the exception of two policemen standing in the doorway. The Mayor became desperate and exclaimed: 'I knew it would be so; the thing is a total failure!'. 'Is there anyone inside?' he asked the policeman, who replied 'The place is packed, and we had to turn away two hundred half an hour ago.' Much later, Ball was to remark that in Chipping Camden he lectured to 500 people, which represented one eighth of the town's population: quite an achievement! Tickets to Ball's lectures were snapped up well in advance, and often there were stories of touts selling them at many times their face value.

Ball sometimes found himself in the midst of a throng; caught up in the crowds on several occasions. On 7 January 1890 he arrived at a chapel venue in Goole, to find that there was a huge crowd waiting outside, and many people walking away looking downcast. A passer-by told him it was no use trying to get in as it was a sell-out. Ball eventu-

ally got to a side door where people were still being allowed to squeeze in. When he tried to gain entry, the doorman asked him for his penny. Ball told him he was the lecturer, to which the doorman replied 'Go on, I've heard that one before!' He eventually got in, and lectured to the audience on *Other Worlds*. During his talk, he discussed observatories, and mentioned that as his train approached the town he had noticed a very tall, domed building near the station, and had thought to himself 'what a splendid observatory they must have here'. Of course, everyone, including Ball, knew it was the water tower; nevertheless the quip greatly amused the audience.

During this lecture, in trying to convey to the audience the distance of the nearest star, he alluded to Henry Wilson, the Chairman, who was manager of the Lancashire and Yorkshire railway. Ball suggested that if Wilson were ever to extend the railway to Alpha Centauri, he would recommend that the fare should be calculated at 100 miles per penny. If that was done, how much would this immense journey cost? His answer was: take to the booking office 5000 carts, each carrying a ton of sovereigns - a total of £700,000,000, an amount then equal to the National Debt. Would they get any change? He said that they would have to expect a long wait whilst the clerk counted the money, and not be too surprised when they were asked for another £103 million before getting the ticket.

Ball took a keen interest in all that was going on around him, and on several occasions descended into the depths of the Earth to see the workings at the coalface. These first-hand experiences helped illuminate many of his lectures. A visit to Bristol, for example, could not go by without watching the tide come in from a vantage point on the Clifton suspension bridge. A spectacle he used to illustrate his lecture *Time and Tide*.

Ball's lectures were always well-planned affairs, but occasionally a mishap occurred. He would often tour with two lectures, alternating between towns, but taking with him the necessary slides, etc. On reaching the end of a tour in the North of England, he lent a box of slides to a friend, thinking he had no further use for them. On arrival at Leeds railway station in the late afternoon, he found the town placarded with the announcement that he was to lecture on *Krakatoa*²⁴. These were the very slides that he had loaned to his friend. His remaining slides were for his *Moon* lecture, not altogether appropriate for the advertised event. He consulted with the Secretary of the Institution and decided that *Krakatoa* was what was expected and he would make do with what he had. He asked if a terrestrial globe could be obtained, and a very large one was found in the basement. Unfortunately, it had scarcely reached ground level, when it fell with a loud crash into the basement, breaking in two. However, Ball used this incident to good effect as

he told his audience that the globe, like Krakatoa, had suffered the effects of a local earthquake.

His lecture tours were also opportunities for Ball to satisfy his enquiring mind and quest for knowledge. Not for him dingy hotel rooms of provincial towns. He much preferred to stay at the home of some local dignitary, where he could be assured of good food and good company. Following his first B.M.I. lecture he stayed with Mr Follett Osler F.R.S. at 86 Harborne Road, Birmingham²⁵, the famous crystal glass manufacturer, whose Glass Fountain was the centrepiece of the Great Exhibition in 1851. The clock that Osler used to regulate time in Birmingham is on the wall of the main staircase at the B.M.I. Later that week he was the guest of Osler's neighbour and close friend, Alfred Elkington, who lived close-by in Augustus Road. His factory in Birmingham employed 800 men, and produced all types of electro-plated wares.

Birmingham was not Ball's only port of call in the Midlands. He often lectured in Wolverhampton, West Bromwich and Walsall. He gave many lectures around Birmingham over the years: one evening he might be found addressing the 50 members of the very exclusive Vesey Club in Sutton Coldfield where he was also President²⁶, whilst the next he would be in Walsall with an audience of 1,100 working men.

In St Helens he would stay with the Pilkingtons, and was fascinated by his tour of their glassworks. No doubt he would have visited Chance Brothers Glassworks whilst in Birmingham, though there is no record of this. His interest here would have been more than astronomical. Chance were responsible for the optical systems in use in lighthouses around the British Isles. Ball was scientific advisor to the Irish Lights Board. Every summer he would join the Commissioners of the Board for a 3-week steamship cruise round the Irish coast, examining all the lighthouses. He carried out many tests with gas, oil and electricity to see which gave the best light in different conditions²⁷.

Ball was a very keen and able photographer, and liked using his slides in lectures, and to show them off to appreciative audiences, especially if the subject was the Irish coastline. A selection of the hundreds of photographs he took was published in 2003²⁸. Particularly interesting are the photographs of the construction of the Fastnet light, which Ball described as 'the most beautiful light in the world'.

During his lectures Ball would describe in simple terms the workings of the Universe, drawing comparisons to everyday experience, for example, the train journey to Alpha Centauri. When describing the Sun and its relationship with the Earth, he claimed that if all the coal on Earth was burnt at once it would not give out as much heat as the Sun in one tenth of a second.

He loved to quote the poets. At the end of

his lecture *An Evening with the Telescope* (Figure 6), and in an effort to impress on his audience the vast size of the Universe and the number of stars it contained, he would recite these lines from his fellow countryman, William Allingham²⁹:

But number every grain of sand,
Wherever salt wave touches land,
Number in single drops the sea,
Number the leaves on every tree,
Number earth's living creatures all,
That run, that fly, that swim, that crawl;
Of sands, drops, leaves, and lives, the count
Adds up into one vast amount,
And then for every separate one,
Of all those, let a flaming sun,
Whirl in the boundless skies, with each
Its massy planets, to outreach
All sight, all thought; for all we see
Encompassed with infinity,
Is but an island.³⁰

WEDNESDAY, MARCH 24th, 1897.

LECTURE
BY
SIR ROBERT BALL, F.R.S.
Lowndean Professor of Astronomy and Geometry at Cambridge.

"AN EVENING WITH THE TELESCOPE."

SYLLABUS.

A visit to a Royal Observatory.—The taking of a transit in the meridian room.—The revelations of the spectroscopic. How human vision is aided by photography.
How the pupil of the eye explains the telescope.—View of the meridian instrument and the spider lines.—The great telescope in Europe.—Advantages of a mountain observatory.—How a night was spent at Lord Rosse's great telescope.—A mighty reflector.
Some reminiscences of great telescopes.—How we sound the depths of space.—The grandeur of the walls of Heaven.
Views of celebrated celestial objects.—A photograph of the Moon.—A chart of our Satellite.—Pictures of some of the most striking lunar craters.—Representations of an ideal lunar landscape.—Comparison between a volcanic area on the Moon with a district in the neighbourhood of Vesuvius.—View of the other globes that most resemble the earth.—Special study of the planet Saturn.—Examination of its wonderful ring system.—The mysterious eclipse veil.—A myriad host of little moons.—Physical nature of the ringed Planet.
The grandest truth in Nature.—Our Sun is no more than a star, the other stars are no less than Suns.—How the Sun would appear when viewed from a star.—The great surveying problem.—How to find the distance of a star.—Attempt to realize a length of twenty billions of miles.—Let us calculate the railway fare for a journey from the Earth to the nearest of the fixed stars, and yet this is but a step in the unfathomable extent of space.
Illustrations of interesting stellar objects.—A star photograph showing worlds that no eye can ever see.—The scale of the dumbbell nebula.—The beautiful ringed nebula in Lyra.—The constellation of Orion.—A picture from Starland.—A view of the most wonderful object in the Heavens, as seen by the most powerful telescope on the Earth.
The known Universe.—The infinitable extent of space.—The poet's conception of star worlds.

ILLUSTRATED.

Figure 6

Advertisement for a lecture by Ball at the
Walsall Literary Institute

Image taken from Reference 31.

Ball was not very tolerant of disruptions from latecomers, who were often the more well-to-do, who invariably occupied the 6d seats in the front rows. He was quite happy, therefore, to have a good Chairman who could prattle for ten minutes at the start, whilst the latecomers got settled.

He would not venture too far from home to lecture unless he was being well paid. There were often complaints about his high fees; some venues even thought he should impart his knowledge for no fee. His stock answer was that he had a wife and five children to keep, and had no intention of travelling half way across the country unless he was well paid. But did he make money at it; was this the

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reason why he spent so much time lecturing? He wrote to Dr W. Rambaut³² on 17 October 1897:

‘Lecturing is a more permanent source of income than writing, for the same lecture will be available scores of times, while there is (or ought to be) a limit to the number of times the same thing can be written. Then, too, lecturing is an amusing occupation, a rest and a change.’³³

Were his earnings from lectures greater than those from his books? Some of his letters contain details of his fees: in one he asks for 18 guineas and six lectures in Boston earned him 1000 dollars before commission. We do not know his income details, but he left an estate valued at £12 045³⁴, equivalent to almost £750 000 today. So I think we can conclude that his motivation was to lecture for the money, and for the fame it brought him.

Although most of his public lectures were in towns and villages up and down the country, he was also a prominent speaker in the capital, where his most notable and well-remembered appearances were at the Royal Institution Christmas Lectures³⁵ (Figure 7). Though intended for children, adults at these annual lectures often outnumbered the children three to one. Ball would say to the youngsters:

‘Well children, you and I will not mind all these grown-ups if they will only behave themselves properly’

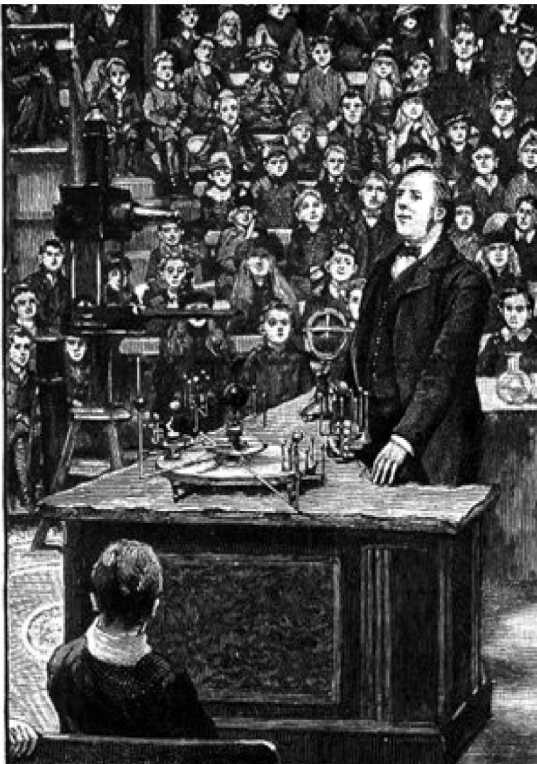


Figure 7

Ball lecturing at the Royal Institution

Image taken from Ball, R.S. *Starland*.
London: Cassell & Co. Ltd., 1890. Frontispiece.

Ball was often asked if he ever tired of lecturing, to which he would reply:

‘Ask a good golfer if he gets weary hole after hole ... Ask W G if he ever tired of scoring century after century. When you have some skill in your art ... the exercise of it is delightful.’³⁶

In the early part of his career, he would lecture on any day of the week, including Sundays, but after several years, gave up Sunday lectures to stay at home. This was partly due to the activities of the Sunday Observance Society. He did however once lecture on Christmas Day. It was on one of his American tours and the Reverend Newell Hillis, pastor of the Plymouth church in Brooklyn, engaged him to speak to 2500 young people. He regaled his audience with a lecture entitled *Time and Tide and Fire-Mist*.

His oratory alone would have kept his audiences spellbound, but Ball was an expert in the use of visual aids, particularly the magic lantern. This would occasionally result in problems as we learn from the account in the *Walsall Advertiser* of the disruption to his first lecture in the town:

‘The enjoyment of the Literary Institute lecture by Sir Robert Ball on Wednesday last was much interfered with by the incompetent mismanagement of the gas. The members of the Institute must look to Mr Alfred Stanley as responsible for this. Never did an audience, however, behave better under prevailing circumstances. May Walsall audiences ever conduct themselves without any approach to panic, under whatever circumstances may arise.’³⁷

No doubt Mr Stanley was suitably embarrassed about this. He was a local businessman, whose factory on the outskirts of Walsall manufactured a wide variety of buttons³⁸.

During his lecturing career, Ball missed only one lecture, and that was also in Walsall. He had been due to speak to the Walsall Literary Institute at 8.00 p.m. on 30 October 1895, but at 5.00 p.m. Mr W Henry Robinson, the Institute Secretary (a member of the Royal Astronomical Society) received a telegram, which read:

‘Our train has just returned to Cambridge. Line washed away. Impossible to reach Walsall tonight. Very sorry for inconvenience. Ball.’³⁹

The Chairman told a disappointed audience that ‘the stars in their courses had fought against the astronomer’. Lecture programmes of the Walsall Literary Institute from the 1880s to 1906 show that Ball lectured there on 8 other occasions⁴⁰, and was the Institute’s President in 1898. He also had the honour of being the first person to lecture in Walsall’s new town hall in 1905.

We have heard of the problems with ‘gas’ in connection with the lanterns, and of course he relied on slides and apparatus of various sorts to enliven the proceedings. In those days many lecturers

cursed the lanternist, who would frequently mix up the slides or show them before the lecturer was ready. Ball was more philosophical; saying that you could not expect from the lanternist, who was paid only a few pennies for an evening's work, what you would expect from the lecturer, who if he was someone of Ball's stature commanded high fees and expenses. Writing to Dr Rambaut on 2 March 1899 he said:

'Unless I warn him beforehand, the man at the lantern will probably make the moon go round the earth as if he was grinding coffee for a wager!' ⁴¹

He would often instruct his lanternist as follows: 'There are eight ways of putting a slide into a lantern ... seven of which are wrong!' One of his lectures, *A Universe in Motion* involved the use of a number of elaborate mechanical slides (Figure 8), and for this he would enlist the services of a Mr James W Garbutt, whose skill at the lantern Ball very much appreciated. Garbutt was a slide manufacturer from Leeds and was the official lanternist for the Gilchrist Lectures in the north of England.



Figure 8

Examples of slides used by Ball in lectures

Top left: Comet c Moorehouse 1908, taken with the 30-inch reflector at the Royal Observatory, Greenwich on 3 October 1908, showing the stellar nucleus with parabolic envelopes.

Top right: One of Ball's many slides of the Moon.

Bottom: A mechanical slide to demonstrate the movement of the planets.

Lanterns were not Ball's only problem. There were hecklers, especially the 'flat-earth men'. John Hampden was one of them, who once wrote to Ball and claimed that the Lowndean Professor relied on the baseless conjectures of heathen astrologers to support his views. He said he would attend Ball's next lecture stating:

'I consider such monstrous lies perfectly scandalous. I will expose you, never fear!' ⁴²

On another occasion, a writer inquired:

'Must not a lecture on Invisible stars be about as entertaining as a concert of inaudible music?'
[signed] 'An Unbeliever'
PS ... I shall be there' ⁴³

Ball's maxim in such cases was:

'The noblest answer unto such, is perfect stillness when they brawl.' ⁴⁴

Apart from the Gilchrist Lectures, which were organised for him, most of his platform engagements required a vast amount of correspondence, so much so that by 1900 he had on his shelves 30 to 40 volumes devoted entirely to lectures⁴⁵. Into each volume he would paste letters of invitation and acceptance, requirements for blackboard, lantern, etc, hospitality letters and poster announcements, Bradshaw's railway timetable, lecture ticket, press cuttings and letters of thanks.

Although his public lectures were confined to astronomy and earth sciences, his expertise in mathematics meant he would give lectures to students on his 'theory of screws'. These were not lectures for the masses; Ball was more than satisfied if he had as many as three students turn up to hear him speak. Readers may be wondering what this 'screw' business was all about. I confess to knowing little, but the following is relevant:

'Ball's *Treatise on the Theory of Screws* is the definitive reference on screw theory. It gives a very complete geometrical account of the problems of small movements in rigid dynamics.' ⁴⁶

Ball's son once asked him to explain the theory to him. The Lowndean Professor replied:

'If I were to begin speaking now, and continued to expound for about six months without interruption, you might have some faint glimmering of what it means!' ⁴⁷

Despite his love for the subject, he once raised a toast to mathematics in an after-dinner speech saying: 'Here's to Pure Mathematics. May she never be of any use to any one.'

On 14 August 1884 Ball made his first transatlantic trip, to Canada, on the S.S. Oregon, under the auspices of the British Association for the Advancement of Science⁴⁸. Also on the tour were John Couch Adams and Sir Oliver Lodge. All were to lecture at McGill University in Montreal. *The Times* in an article prior to the visit said:

'Professor Ball, the witty and eloquent Astronomer Royal for Ireland, will deliver the popular lecture - par excellence.' ⁴⁹

On this tour, Ball lectured not just on astronomy. In Montreal he was engaged by an agent from Boston to give six lectures in the United States. Ball asked for £40 per lecture; he got it, less the agent's 10%. In September he crossed the border into the United States, and gave a useful talk on *Screws* to the American Association for the Advancement of

Sir Robert Ball



Figure 9

Cylindroid used by Ball in his lectures on screws

Image courtesy of the Science Museum, London

Science⁵⁰. For this lecture he used his newly-acquired cylindroid⁵¹ (Figure 9), which Howard Grubb of Dublin had made especially for him. Ball's Boston lectures were reviewed in the *Boston Herald*, which reported:

'He has not quite the oratorical ability of Prof. Langley^[52], and suffers from a slight impediment to his speech, but he has a smooth clear voice, with a use of it, at times, quite clergimanic.'⁵³

When Ball read this he said: 'I must try and correct these trifles'.

Ball was an expert speaker; it is said that he never used notes. When asked about this he would reply: 'How can a lecturer expect an audience to remember his lecture if he is unable to recollect it himself.' But in his early lectures he would often hesitate and stammer, even losing his train of thought on occasion. However, on this US tour he decided to write out his lectures in full and to read from the manuscript. He repeated each lecture on so many occasions that eventually he knew them off by heart. Initially, though, he read them as he had written them, almost word for word.

For almost 30 years, from the mid 1870s, Ball carried out two main lecture tours in Britain, in January and November each year. In addition, he would give many one-off lectures at towns up and down the country. He must have had remarkable stamina to keep up this round of lecture tours and engagements, in addition to his University commitments. Remember, his only modes of transport were the railways and horse-drawn carriages, and ocean liners, of course.

It was Ball's lecture tour to the United States in 1901 that was to be his most ambitious and profitable, with 45 lectures in 11 weeks. He travelled out on the White Star liner S.S. Cymric in October and in a hectic first round completed 24 lectures in 29 days. He almost missed his first lecture in Boston - because of bad weather, the Atlantic crossing took an extra day. He arrived with just an hour to spare. He travelled throughout the mid-west and the eastern states, visiting Chicago, Boston (where he was a house guest of Percival Lowell), Philadelphia, Pittsburgh, Baltimore, Minneapolis, Washington D.C., and naturally, New York. He met many important people, and was constantly being invited out to dinner. Among those from the astronomical community he chose to mention were Professors Hale, Barnard and Burnham at Yerkes Observatory; Simon Newcomb of the United States Naval Observatory, Washington D.C. One night, at the theatre, he was introduced to Mark Twain.

Sometimes he was favoured with a captive audience, notably on his sea voyages. He lectured to the passengers and crew on one of his transatlantic trips, and in 1896 aboard the S.S. Norse King, his audience was bound for Norway to view the total solar eclipse (Figure 10).⁵⁴ No doubt his enthusiasm about the forthcoming event turned to disappointment when the 106 seconds of totality were spoilt by cloud cover. Two years later, whilst on holiday in Devon, he wrote to his son:

'Dearest Bill

If you want free tickets for your friends to hear a lecture of mine, now is their chance. Let them hurry up and commit bigamy, or arson, or any really good felony short of actual murder and they will have a free ticket, indeed a compulsory ticket forthwith. I shall have both clergymen and lawyers in my audience. On Friday I lecture to the convicts at His Majesty's Prison on Dartmoor!'⁵⁵

One couldn't get a more captive audience than that!

When his repertory was complete he was indifferent as to which lecture he gave to any particular audience. Ball once told an enquirer:

'I can congeal you with the *Ice Age* or burst you up with the thunders of *Krakatoa*. I can tell you whoppers about *Time and Tide* or petrify you with a burst of eloquence about *Invisible Stars*. And I usually put the greatest rot into a lecture about *Other Worlds*.'⁵⁶

His books on popular astronomy numbered thirteen, and most of them ran to several editions and revisions. *Story of the Heavens* was his best seller; the 5th edition of his *Popular Guide to the Heavens* was published as late as 1955. Many of these volumes are available in the Sir Robert Ball reference library of the Society for the History of Astronomy at the B.M.I.

Ball entered the twentieth Century's second decade in failing health, suffering from diabetes. He

**Figure 10****Ball lecturing aboard the S.S. Norse King in 1896**

Courtesy Royal Astronomical Society. (ADD MS 153)

gave his last public lecture in November 1910 at Caxton Hall in London in aid of the National Society for the Prevention of Cruelty to Children (tickets were 7s.6d., today's equivalent is about £25). He was, however, still able to play golf at Royston Heath until 1912. In the same year he made his final trip with the Irish Lights Board around his beloved Irish coast.

During the final 12 months of his life Ball was for the most part confined to his house in the Cambridge Observatory grounds. He died on 25 November 1913, aged 73 years, and is buried in St Giles cemetery, just a few hundred yards from the Observatory, near to his predecessor in the Lowndean chair, John Couch Adams.

Here then was probably Britain's most popular astronomer. For 35 years, from 1874 to 1909, Sir Robert Stawell Ball virtually personified astronomy to the English-speaking world. He communicated astronomy to the public in an optimistic and positive way, making it appear a worthwhile pursuit. This was also crucial for scientists in other disciplines, at a time when the issue of endowed research was becoming increasingly important.⁵⁷ Despite being well respected at all levels, from the factory workers of northern England and the Midlands, to the patrons of London's finest clubs and learned societies, he was occasionally held in contempt by some of the scientific establishment. They would grumble about his 'utterances' to the press; and some of his written work was criticised in terms

such as: 'This is not what is expected of the Lowndean Professor.'

But Ball's unfading reputation will not just rest on his achievements as a lecturer and populariser of science, great as they were, or even as an astronomer, in which capacity he lacked the advantages of professional training. It will be based on his work as a great mathematician, which was his most absorbing interest, and to which he devoted much of his leisure.

The total number of lectures he gave is not known, but it is recorded⁵⁸ that between 1874 and 1884 he gave 700, and he lectured almost continuously for the next 20 years. He therefore probably gave more than 2,500. It is estimated that, not counting many thousands of students and fellow scientists who heard him speak, he lectured to well over one million people at his public meetings.

Ball had an inspiring personality: his voice, manner and good humour excited interest and enthusiasm in his audiences. His Royal Astronomical Society obituary recalled:

'The great popularity he attained is convincing evidence of the wide interest in astronomy which he thus excited. It is common knowledge how small the influence may be which affects a receptive mind, and leads it to further study and development, and in this way Ball's lectures cannot but have given a strong impulse in this country to the advancement of the study of astronomy.'⁵⁹

Sir Robert Ball

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Notes and References

- 1 The Birmingham and Midland Institute (also known as the 'B.M.I.' and the 'Midland Institute') was founded by Act of Parliament in 1854, for the 'Diffusion and Advancement of Science, Literature and Art amongst all Classes of Persons resident in Birmingham and the Midland Counties'.
- 2 Much of the content of this paper is taken from *Reminiscences and Letters of Sir Robert Ball* edited by his son, W Valentine Ball. London: Cassell. 1915, the only biographical work on Ball. This source is referred to as *Reminiscences* in the remainder of these Notes.
- 3 For a more detailed account of Robert Ball's early years, see the author's lecture transcripts at http://www.geocities.com/ziksby2/Sir_Robert_Ball.
- 4 Mitchell, O.M. *The Orbs of Heaven*. London: Routledge. 1860.
- 5 J.C. Adams had been Lowndean Professor of Astronomy and Director of Cambridge Observatory since 1858.
- 6 Ball, W.V. *Reminiscences*. 137.
- 7 Dublin Philosophical Society was founded in 1684 by students of Trinity College, Dublin. It is the oldest undergraduate society in the world.
- 8 A club for individuals known for their scientific, literary or artistic accomplishments.
- 9 Ball, W.V. *Reminiscences*. 188.
- 10 Willis, Rev. Robert. *A System of Apparatus for the Use of Lecturers and Experimenters in Mechanical Philosophy, Especially in those Branches which are Connected with Mechanism*. London: John Weale. 1851.
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- 13 Ball, W.V. *Reminiscences*. 190.
- 14 Ball, W.V. *Reminiscences*. 192.
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- 21 Ball, W.V. *Reminiscences*. 216.
- 22 Ball, W.V. *Reminiscences*. 217.
- 23 Ball, W.V. *Reminiscences*. 217.
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- 25 Ball, W.V. *Reminiscences*. 192.
- 26 Sutton Coldfield Public Library (Bishop Vesey Section) Unreferenced pamphlet on Vesey Club.
- 27 Ball, W.V. *Reminiscences*. 246.
- 28 Farrelly, Michael. *For the Safety of All*. Dublin: National Library of Ireland. 2003.
- 29 Ball, W.V. *Reminiscences*. 227-228.
- 30 Allingham, William. *In a Cottage Garden* (date and place of publication unknown).
- 31 Walsall Literary Institute Programmes. Bound volume in Walsall Local History Centre, Essex Street, Walsall. West Midlands WS2 7AS.
- 32 Dr W. Rambaut was an assistant to Lord Rosse at Birr Castle 1848-1850, and a friend of Ball.
- 33 Ball, W.V. *Reminiscences*. 221.
- 34 Birmingham Central Library. Index of Wills and Probate Records (1858-1972).
- 35 Ball, W.V. *Reminiscences*. 205.
- 36 Ball, W.V. *Reminiscences*. 220.
- 37 *Walsall Advertiser*. 14 November 1888.
- 38 1881 census.
- 39 Ball, W.V. *Reminiscences*. 223.
- 40 *Walsall Red Books* show that Ball was scheduled to give the following lectures:
26 January 1887, *Glories of the Midnight Sky*
14 November 1888, *Time and Tide*
3 February 1892, *Invisible Stars*
14 November 1894, *Recent Researches on the Sun*
30 October 1895, *Recent Discoveries about the Sun* [This lecture was not delivered.]
24 March 1897, *An Evening with the Telescope*
18 January 1899, *Lances of Heaven* [Presidential address]
28 November 1900 *Recent Discoveries about the Sun*
18 October 1905 *Famous Volcanic Eruptions* [The first lecture in Walsall's new Town Hall.]
- 41 Ball, W.V. *Reminiscences*. 220.
- 42 Ball, W.V. *Reminiscences*. 231.
- 43 Ball, W.V. *Reminiscences*. 231.
- 44 Poem by Alfred Lord Tennyson: *Literary Squabbles*. 1846.
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- 46 Publisher's note from: Ball, R.S. *A Treatise on the Theory of Screws*. Cambridge: Cambridge University Press. 1st Edition re-issued 1998.
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- 48 Ball, W.V. *Reminiscences*. 318.
- 49 *The Times*. Number 31076. 8 March 1884. 4a.
- 50 Wayman, P. A. A visit to Canada in 1884 by Sir Robert Ball. *Irish Astronomical Journal*. 1986, 17. 188.
- 51 This is a wire model of a 'cylindroid' in brass glazed cylindrical case on a wooden base, by Howard Grubb, Dublin. The model was made on the instructions of Robert Stawell Ball. Now in the Science Museum, London.
- 52 Samuel Pierpont Langley (1834-1906) was an American astronomer, physicist and aeronautical pioneer.
- 53 *Boston Herald*. 15 October 1884. 4.
- 54 This was the first eclipse expedition organised by the youthful British Astronomical Association, founded in 1890.
- 55 Ball, W.V. *Reminiscences*. 239.
- 56 Ball, W.V. *Reminiscences*. 225.
- 57 See, for example: Whyte, Nicholas at: <http://www.explorers.whyte.com/ball.htm>.
- 58 Ball, W.V. *Reminiscences*. 224.
- 59 [Edward] B[all] K[nobel]. Obituary. Robert Stawell Ball. *Monthly Notices of the Royal Astronomical Society*. 75(4). February 1915. 230-236.

