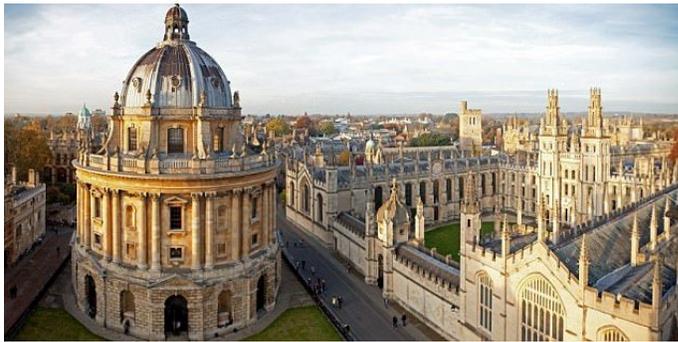


Middle School Scholars' Newsletter

Michaelmas Term 2018

The Oxford Issue



Introduction

It's been an active term for the Middle School Scholars. We've had a lecture from Dr Sally Rodgers about the relationship between poetry and music, the Middle School Scholars Presentations Evening and Dinner, as well as the 5th Year trip to Oxford, with a talk from OA Ollie Sayeed yet to come.

This inaugural edition of the newsletter is full of an eclectic range of articles by the fifth year scholars inspired by their Oxford trip, and we think it showcases the three key values of Abingdon's scholarship programme at its best: independence, inquiry and initiative. We hope you enjoy it and have a wonderful Christmas.

Andrew Jamison

Head of Middle School Scholars

CONTENTS

Drake's Chair at the Bodleian by Toby Hindley... p2-3

Cultural Differences in Traditions of the Dead by Alfie Marshall... p3-5

The History of General Augustus Pitt Rivers by Henry Wooding... p5-6

The Haida Totem Pole by Nicholas Pearson... p6-8

The Oxford Museum of Natural History and its Architecture by Jakob Hobbs... p8-9

The History of the Bodleian Library by Thomas Rolfe... p9-11

The Bodleian, Literary Classification and Copyright Libraries by Rory Bishop... p11-13

Why Do Some Rocks Glow? by Daniel McNamara... p13-15

Particle Physics: A Summary of Prof. Ian Shipsey's Talk by Ashwin Tennant... p15-17

From the Pitt Rivers: A Model of a Mongolian Temple, and Some Shrunken Heads by Will Wakelam... p17-18

Bee Colonies by Will Taylor... p19-20

Knowing by Johan Nerlov... p21

Drake's Chair at the Bodleian by Toby Hindley



On our trip to Oxford we visited New College (where we received a guided tour from OA Anthony Bracey), the Bodleian Library, the Pitt Rivers Museum, the Natural History Museum and the new Particle Physics Lab. During this

trip we saw many interesting things and were told a lot about the history of places and what went on inside these parts of the college and city. On the trip there was one particular artefact that as soon as I saw it I thought would be interesting to research and write about: Sir Francis Drake's chair in the Divinity School within the Bodleian Library.

The artefact itself is an oak chair made of Francis Drake's ship, the Golden Hind, that travelled the seas exploring the world under Queen Elizabeth I's orders. The chair was fashioned by John Davies in 1662 after the ship's structure decayed due to the bad weather and rain in Deptford where it had been left on the orders of the queen in 1581. Most of the very little good remaining timber was fashioned into the chair after it was broken up. The rest of the timber is believed to be buried in Convoy's Wharf, a former Tudor shipyard. On the back of the chair hangs a short poem by Abraham Cowley, in both Latin and English, which commemorates the history of the chair. The verse goes:

*To this great ship which round the Globe has
run,
And matcht in Race the Chariot of the Sun,
This Pythagorean Ship (for it may claime
Without Presumption so deserv'd a Name
By knowledge once, and transformation now)
In her new shape, this sacred Port allow.
Drake and his Ship, could not have wisht from
Fate
A more blest Station, or more blest Estate.
For Lo! A Seate of endles Rest is giv'n
To her in Oxford, and to him in Heav'n.*

Sir Francis Drake was an English sea captain, naval officer and explorer born in 1540. He discovered many new lands on his journeys and helped to expand the British Empire in his time, famously claiming what is now California for England during his incursion of the Pacific. By doing this he also started an era of conflict with the Spanish over the west coast of the Americas, which hadn't previously been properly explored by Western countries.



Through this and other big events, namely the Spanish Armada where he was second in command, he became disliked by the Spanish and was branded a pirate. This is not because of his conflicts with the Spanish but mainly because of his privateering and raids on Spanish waters where he would capture Spanish ships and treasure shipments and rob them of their goods, taking these spoils back to the queen. It even got to the point where King Philip II offered 20,000 ducats (£6 million

in today's money) as a reward for his capture or death. This is why when he was knighted for his services to Queen Elizabeth I it was done by a Frenchman and not the queen, in order to stop there from being any conflict with Spain. Sir Francis Drake is one of the most famous sea captains in history and like any sea captain he had his own equally famous ship, the Golden Hind, which the chair is made from.

The Golden Hind was an English galleon that became only the second ship in history to circumnavigate the globe between 1577 and 1580. The ship was originally known as Pelican but was renamed in 1578 mid-way through the circumnavigation in honour of Sir Christopher Hatton whose crest was a golden hind. Hatton was one of Drake's main sponsors for his world voyage hence why Drake changed the name of the ship in honour of his donation. During its circumnavigation it was tasked unofficially by Queen Elizabeth I to steal treasures off the Spanish and Drake achieved this with great success. On 1 March 1579, off the coast of Ecuador, the Golden Hind challenged and captured the Spanish Galleon Nuestra Señora de la Concepción, capturing the largest treasure to that date: over 360,000 pesos (equivalent to around £480 million in today's money). When Drake returned, half this money went to the queen, letting her pay off all of her government debt and still leaving her with a quarter of the money left to invest in a new trading company for the Levant. All of the investors of the trip got a 4700% return for what they put in (£47 for every £1).

To conclude, this artefact is a very interesting one that has travelled the world and been a huge part of history, now converted to a very

understated chair that had we not have been shown, I wouldn't even have noticed.

Cultural Differences in Traditions of the Dead by Alfie Marshall

During a recent trip to Oxford, we visited the Pitt Rivers Museum, and I was inspired by an exhibit on "Treatment of the Dead" to write about this subject. I have outlined several different ways in which different cultures around the world treat death and the dead.

South Korea - There was a law passed in 2000 which said that anyone burying a loved one had to remove the grave after 60 years. This law, in addition to graveyard space depleting, led to cremation becoming a much more popular option than in the past. Ten years ago, 6 out of 10 people were buried traditionally, but due to cultural changes this figure has now changed to 3 out of 10.

However, there is another option - several companies

make "death beads", which is when the deceased's remains are compressed into small, shiny beads in blue-green, pink, or black. They are then displayed in dishes or in glass containers to keep them nearby.



Tibet and Mongolia - Many Vajrayana Buddhists in Tibet and Mongolia choose to have a traditional sky burial - around 80% of Tibetans still choose it today. They believe in

the transmigration of spirits after death, which is when the soul leaves the body and moves on. In order to return the body to the earth, they chop it up into pieces and lay these pieces on a mountaintop, where it is exposed to nature and vultures. This has been done for thousands of years up to the present day.

The Philippines - Many different ethnic groups in the Philippines have unique traditions for the dead. The Apayaos wrap the deceased person in a mat (ikamen) and they are carried on the shoulders of the immediate male family members. They are then buried under the kitchen of their homes. The Tinguian peoples dress the dead in their best clothes and sit them on a chair for many weeks. They then sometimes put a lit tobacco source between their lips. The Ilongot is buried in a sitting position, and if she is a woman her hands are tied to her feet to stop the “ghost” from roaming. The Caviteño use trees to bury their dead. When a person is terminally ill or very old, they choose a tree they want to be buried in, and a hut is then built near it. When they die they are placed vertically inside the hollowed out trunk of the selected tree.

Australia - In Aboriginal societies in Northern Australia, they have very elaborate rites for the dead. A smoking ceremony is held near where the deceased person lived, which is meant to drive away their spirit. Then there is a feast with food and dance, and the people are traditionally painted ochre - the body is then put on a platform, and covered in leaves where it is left to decompose.



In some traditions, fluids from the platforms can help to determine the killer of the deceased.

Madagascar - The Malagasy people of Madagascar hold a ritual called “famadihana” (the turning of the bones). Every 5 or 7 years, families celebrate at their ancestral crypt, with dancing and music, and take the bodies of their ancestors from their graves and lift them onto their shoulders to celebrate with them. Some people spray the bodies with expensive perfumes or splash them with wine. They believe the bones of their ancestors “must never become lost in the world” and this ritual is very important for that reason.

Ghana - In Ghana, people want to be buried in coffins that represent something special about them such as their work or life. They are called “fantasy coffins”, and can be seen as quite unusual - some examples are a giant fish for a fisherman, a giant bible for someone who loved going to church, a coca-cola bottle, or, even cigarette packets. Coffin makers are highly sought after and regarded highly, and funerals are seen very differently to in England, as they are huge, costly events costing as much as weddings, and are advertised on billboards for anyone to go.

Bali - Balinese cremations are unusual in the sense that they are times for fun and excitement. An example of one of the most extravagant cremations was Agung Suyasa's, the head of the royal family, which took place in 2008. He was burned with 68 other people. There were thousands of volunteers who carried a huge bamboo platform, a giant wooden bull and a wooden platform. After the procession, his body was burned inside the bull. Balinese people view cremation as releasing the deceased's soul to inhabit a new body, and to them it is a sacred duty and an incredibly important tradition.

The History of General Augustus Pitt Rivers by Henry Wooding

Pitt-Rivers was born Augustus Henry Lane Fox at Hope Hall in Yorkshire on April 14th 1827. His family were significantly wealthy as they owned a large amount of land and in 1880 he inherited both the name and the estate Rivers from his great uncle. He also received a yearly salary of £20,000 for the remainder of his life as a landowner, Rivers' wealth and property was fundamental to his archeological exploits as many key finds were on the site of his estates and he could independently fund digs.



Rivers' work in history and the collection of historical objects was mainly from later on in his life, for the majority of his life he was an army officer, having gone

to the Royal Military Academy before being commissioned into the Grenadier Guards in 1845. He served internationally, most notably in the Crimean War, Malta, Canada and Ireland. Rivers was a successful soldier and was awarded Lieutenant-General when he retired in 1882. Rivers' time in the military was a significant influence on his interest in history, indeed many believe that his initial interest in history was the history of the firearms he used in his time in the Grenadier Guards, particularly the transition from muskets to rifles. As well as sparking his passion for history, some of Rivers' first items were collected while he was on active service - as well as his first piece of archeological investigation, in the 1860's in Ireland. His archeology was given a huge boost when he acquired Cranborne Chase Estate in Dorset which contained many different potential sites. Rivers was thorough in archeology and recorded the position and details of every object (no matter how significant) and produced detailed maps and publishings about each site

While Pitt-Rivers has a reputation for field collecting, in reality he did very little and most of his collection came from donations or was bought at auction or dealers. What is true is that the collection is huge, while there are no specific estimates, over 20,000 different items were donated to the Pitt Rivers Museum in 1884 and with time that number has only grown, by 1999 the number of objects had reached 10,000.

Rivers was not just concerned about the monuments themselves but also how to display them with significance and meaning. He was a pioneer of typology; displaying

artefacts in a chronological order to illustrate the development of a civilisation or country. In the thrilling words of the man himself 'The objects are arranged in sequence with a view to show ... the successive ideas by which the minds of men in a primitive condition of culture have progressed in the development of their arts from the simple to the complex'. This style of presentation had its flaws, mainly the fact that this was incredibly difficult to do due to the huge number of artefacts (the current museum has now mostly abandoned the policy) and the fact that the finding the 'evolution' was mainly guesswork but for the time, and on a small scale, it was revolutionary. Rivers also valued everyday historical objects that he found and was interested in the day to day lives of the people who used them ; he believed that history should not merely be 'works of art' but more grounded and realistic to show the people who lived long ago as regular people. The vagueness of the museum is deliberate as dates and details were only included if 'the advance of knowledge required it.'



Rivers initially hoarded his findings in his house but quickly ran out of space to house them. In 1873 he decided that his collection should be publicly exhibited, initially to the South Kensington Museum and then, upon retirement from the army, he settled on Oxford University as a permanent home for his collection. An annexe was built and the first

iteration of the Pitt-Rivers museum was opened in 1882.

As well as being a prominent collector and curator, Rivers held several high positions in the scientific community, he was Britain's first inspector of ancient monuments and President of the Anthropological Institute. Rivers died in 1900 at 73 having dedicated his life to the advancement of history and historical learning for all - as well as founding Britain's most confusing museum.

The Haida Totem Pole by Nicholas Pearson



On the trip to Oxford one of the places we visited which I found most interesting was The Pitt Rivers Museum. It was full of all kinds of artefacts from all over the world that had come from the collection of a nineteenth century archaeologist called Pitt Rivers. In the middle of the museum stood The 'Haida Totem Pole' which was three floors tall and towered over the rest of the museum. It caught my attention not only due to its sheer size but also because of its unusual design and the strange

shapes and faces that were carved into it. I

decided to do some research into the origins of totem poles and what they symbolise and the background of the one I saw in the museum in particular.

The 'Haida Totem Pole' which I had seen in the museum originally came from Haida Gwaii, an archipelago off the west coast of British Columbia in Canada, nearly 5000 miles from where I saw it in Oxford. These islands are covered in forest and are home to the Haida people who have inhabited the islands for 13,000 years. This totem pole was carved out of red cedar wood and originally stood outside the house, known as the Star House, of a chief (chief Anetlas) in the village of Uttewas and was put up at a ceremony when he adopted his daughter over 125 years ago. The ceremony involved giving the traditional family rights to his daughter and the reciting of the family lineage which were then marked on the totem pole.

The totem pole is covered with symbols of animals that represent the family's history and are read from the bottom, where they are most visible to someone standing on the ground and so the most important, to the top. At



the bottom of the Haida Totem pole is a raven with a human between its wings. The Raven was seen as the most important animal on totem poles, despite symbolising trickery, as the Haida people believed that it pecked open a shell to release the first human into the world. Above the raven on the totem pole is a bear holding a human with two bear cubs at its feet; the bear represented foraging, hunting and also help in battle. Then above that was

another bear with a frog in its mouth which symbolised wealth and good fortune. Finally at the top of the totem pole were three seated watchmen. These are meant to watch over and protect the village just like real watchmen each village had who held a very honorable position in the tribe.

The tradition of carving totem poles isn't something that was done over all of native America, as is commonly believed due to films, it was actually specific to the Pacific Northwest and the most prolific area for it was Haida Gwaii where the 'Haida Totem Pole' came from. However the Haida people were also known for their warlike nature. They used their carving skills and craftsmanship to carve Cedar trees into big canoes that could transport up to 60 warriors over the 60 miles of open sea to mainland British Columbia where they would raid the land and capture slaves (although fortunately this is a tradition that is no longer continued).

In 1901 the totem pole was bought for \$36 by Professor Newcombe, a private collector of natural history from British Columbia and Reverend John Keen, a missionary and naturalist who was mainly interested by the different species of birds on the Charlotte islands. However it is unknown why the chief would have wanted to sell it as it would have been very valuable particularly to him as it was a symbol of his family history. Once they had acquired this totem pole Newcombe and Keen decided to donate it to the Pitt Rivers Museum and so it was shipped all the way to Oxford and had to be



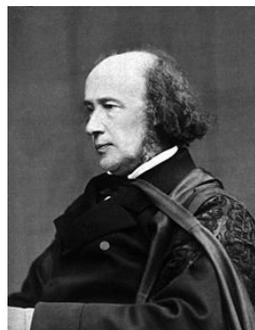
cut in half to be transported.

In conclusion I was very interested by the totem pole in the museum and even more so when I did some research into it and found out the history of it and the people and islands it had come from. The intricacy of the carvings and the object was very impressive but what was fascinating was the stories that were behind it and how it had once just been a tree, then become a symbol of a chief's family history before it had been transported a hundred years ago over half way round the world to be in the museum in Oxford where I'd seen it.

The Oxford Museum of Natural History and its Architecture by Jakob Hobbs

The Oxford University Museum of Natural History is a magnificent feat of architecture which was not only groundbreaking due to its remarkable design but also because it exemplified the principles of the art critic John Ruskin. It is a striking example of Victorian Neo-Gothic design and it unsurprisingly was influential in the development of 19th Century architecture.

The key exponent of the idea for a new museum was Dr Henry Acland. Acland had been appointed Reader in Anatomy in 1845 and firmly believed that every man should have



the opportunity to learn Sciences. He campaigned for a new building to house collections, classrooms and laboratories of the new School of Natural Sciences which he had played a significant role in establishing. In 1853 the University agreed to the construction of a museum and opened an anonymous competition to select an architect. Thirty-two designs were submitted of which two were shortlisted. The two schemes proposed were very different with E.M Barry submitting a Palladian design and Benjamin Woodward a Neo-Gothic. In December 1854 Acland accepted Woodward's proposal and construction began soon after.



Prior to December 1854, Ruskin's influence on Woodward had only been indirect but his ideas were certainly present in Woodward's initial plan. Ruskin believed that architecture should be shaped by energies of the natural world and notably wrote an extended essay 'The Seven Lamps of Architecture' on this matter. Practically, he promoted 'honest' architecture with no veneers, finishes or hidden support and argued that beauty must be derived from nature and crafted by man. In her study *Ruskinian Gothic*, Eve Blau argues, 'Ruskin's writings only served to articulate ideas already nascent in Woodward's architecture, but they also gave direction and formed to these ideas'.

Acland, who was a lifelong friend of Ruskin, brought the two men together and from then on Ruskin was instrumental in the construction, particularly with regards to decoration and use of materials. Ruskin commissioned a number of Pre-Raphaelite artists and lectured workmen on site, reminding them that medieval architects did not treat their men as mere machines: ‘they all worked together as one man’.



However, Ruskin eventually became disillusioned with the project and would never work so closely with a Gothic Revival project again.

Perhaps most interesting was that the museum was the first secular public building to be constructed in the Gothic style other than the Houses of Parliament. Even though Ruskin himself suggested that the museum was only a beginning and that ‘lovelier and juster expressions of the Gothic principle will be ultimately aimed at’ the building is still a clear expression of his ideas. It certainly delivered on Ruskin’s advice to ‘adopt the pure and perfect forms of the Northern Gothic and work them out with the Italian refinement’. However, Robert Hewison argues that what made this building so special was that ‘It was using the Gothic in support of modernity rather than in an antiquarian or ecclesiastical fashion.’

Perhaps the most striking feature of the building is the combination of glass and iron columns. Whilst the use of glass and cast iron had been commonplace since the mid-1840s most famously in the Crystal Palace of 1851 the novel aspect of the museum was the use of

structural iron. The interior was made all the more impressive when juxtaposed with the traditional Italian facade. The use of the new materials was not contrary to Ruskin’s ideas. The iron tubes bracing the ceiling were designed to be reminiscent of tree branches, the columns were constructed with a variety of British decorative rocks and the capitals of the interior depicted examples of British flora and fauna.

The museum remains an impressive building to this day and is one of the most popular attractions in Oxford with over seven million objects in its collection. It is such a special building not only because it redefined Gothic architecture but also as it is the most clear representation of Ruskinian ideas and I imagine that it will continue to impress for years to come.

The History of the Bodleian Library by Thomas Rolfe

The Bodleian Library (which comprises the Old Library, Weston Library and Radcliffe Camera) is one of Europe’s oldest libraries, but it has not always been quite as it is today. Nor was it Oxford University’s first: there had been a library from c.1320. The library is now a member of the group of libraries known, since 2010, as the Bodleian Libraries.

In 1602, a new library was opened to scholars at the University. This, known later as the Bodleian Library, was an expansion on the earlier library, the Duke Humfrey’s. Just eight years afterwards, Thomas Bodley made an agreement with the Stationer’s Company of London, which stated that a copy of every

book published in England should be sent to the Library. From this point, the Bodleian expanded to become one of the largest and most renowned in Britain.

The Duke Humfrey's had been built above the Divinity School between 1478 and 1488 to house the books donated by its namesake,



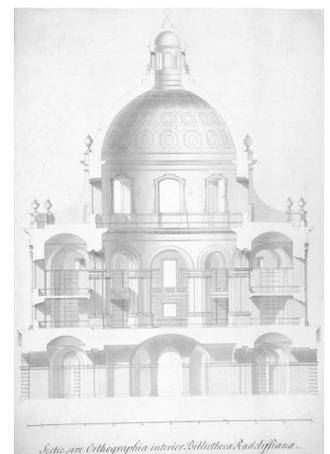
Humfrey, Duke of Gloucester (a brother of Henry V). One of the great tragedies of the Library came when books that contained any trace of Roman Catholicism or other 'superstitious books and images' were burnt under the order of King Edward VI in 1550, during the Reformation. The Dean of Christ Church came to carry out these orders, and either burnt the offending books (presumably a large proportion of the collection), or sold to bookbinders or gloves. It is thought that several books must have survived the iconoclasm and made their way into the private collections of reluctant Reformers. After this, in 1556, the library was taken by the Faculty of Medicine. Then came Thomas Bodley, who had made a fortune through an advantageous marriage to a wealthy widow. In 1598 he presented money to the University to set up the new library. The new agreement that the library would receive a copy of every book published in the country soon led to a great recovery of the collection.

The Bodleian Library is not a library in the sense that we commonly understand the word, though, in that no book may be taken out of

the premises on a loan. The best known case of the execution of this rule came relatively early in the Library's history, in 1645, when King Charles I (who had based his Civil War Parliament in the Bodleian) asked to borrow a history of the world, written by the French poet Theodore Agrippa d'Aubigne. He was refused permission by librarian John Rouse [see picture above], the Statutes forbidding the borrowing of books from the Library by anybody. This, of course, set a pretty clear principle for his successors to follow, in such instances, and has been kept ever since.



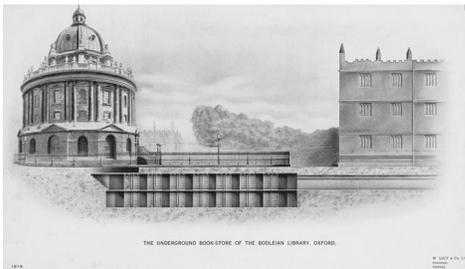
The next wealthy intellectual to enter the stage as a benefactor of libraries in the University was Dr John Radcliffe. He left money to fund the building of what was to be known as the Radcliffe Library. Eleven years of construction saw the completion of Oxford's best-known piece of architecture, designed by James Gibbs. Until 1860, though, the Radcliffe Library remained a separate institution from the Bodleian, despite being its next-door neighbour. The rivalry that this surely created may have been what spurred the growth of the Bodleian in the first part of the 19th century, the age of 'Enlightenment'. In 1849, a calculation put the library's collection at some 250 000 books and manuscripts, while an exotic collection of



artefacts was beginning to amass, most of later migrated to the city's museums.

The takeover of the Radcliffe Library (known from this point by its modern name) was a great development in terms of space, and where only a select few had been regular visitors to the library before this point, the addition of electricity brought about a fresh crop of readers in the late nineteenth and early twentieth centuries.

Between 1909 and 1912, the Bodleian excavated underneath Radcliffe square to provide ever-more needed modern and compact storage for the collection, now growing at 30 000 books a year and soon to reach one million.



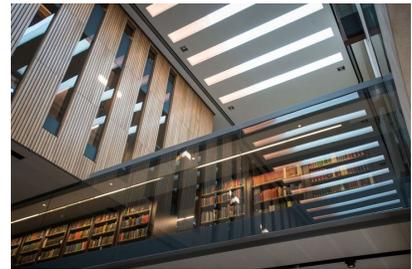
Even this was not, by any means, a final solution: the year 1931 saw plans made to create what would become the New Bodleian Library, following warnings in 1925 from the librarian Sir Arthur Cowley that ten years more would see the library full to the brim. When it was opened in 1946 the new building could hold 5 million books, and had connections underground to the Old Bodleian.



In 1975 the Bodleian purchased the Clarendon building, built in

1713, since which time it had been occupied by the University Press, creating even more space and bridging the awkward gap that had existed between the New Bodleian and its older counterpart.

In the last ten years, we have seen the creation of 'The Bodleian Libraries' in 2010 (along with 8.4 miles of shelving in Swindon) and, in 2015, the opening of the totally redesigned New Bodleian (now renamed the Weston Library). The Bodleian Library is, although a great piece of history, constantly seeking solutions to the problems that inevitably come as a result of time and growth and will hopefully continue to do so for as long as it has already.



The Bodleian, Literary Classification and Copyright Libraries by Rory Bishop

The Bodleian is one of the largest international libraries in the world that is available for public use, as opposed to instead being a site for government documentation. Even then the majority of books are restricted and it is primarily for student use at Oxford colleges. With a collective store of over 12 million books, its history is unprecedented as it is also one of the oldest libraries when compared to its scale and it is regularly updated with every official international publication as well as local publications, the parameters of which will be detailed later. This earned it and similar

libraries the title of 'copyright' libraries.

Established in 1602, the library is almost ten times as old as the British Library in London (another copyright library) which is a mere 45 years old. The core foundation is the Bodleian library itself, although as of the turn of the century it expanded by bringing in 27 other Oxfordian libraries under the collective term of 'Bodleian libraries' although those others are much more diminutive in size comparatively. They are often devoted to specific domains such as medicine, law and music. The Weston library, also known as the West Bodleian or the New Bodleian is parallel to the original site and is the largest of these libraries, home to many modern publications and exhibits, and was built primarily to deal with the growing lack of storage space in the original site. To deal with this lack of a space, most are kept in storage facilities and the Bodleian has expanded underground and into the aforementioned after sites to cope with this.

The matter of storing books is still a massive problem for the library and it has much legislation as to how to categorize and manage books. The library stores books, newspapers, manuscripts, maps, prints and even magazines. Originally the books were less managed but due to increased printing the first legislation came in the form of the Copyright Act 1911, which contained mostly legal jargon but gave outlines which the library adopted. Key factors include that it had to have been copyrighted in the UK in some manner and that public domain novels/media could not be copyrighted if it had been half a century since the owner passed. This was amended further in 2003 by the Legal Deposit act which excluded bus timetables and

ephemera such as health and safety guides, labels, letters, greeting cards etc. from copyright legislation and thus exclusion from the library. The UK is the number one international book publisher, with about 3,500 books published weekly and shipped to the Bodleian every Wednesday. This number is made even greater by certain local publications and other media like newspapers, meaning a mere 20% of the Bodleian's resources is in the libraries themselves. As a result students often have to go through a comprehensive system to order books in my storage in advance.



The Bodleian may not be the world's largest library and does not even rank in the top ten, but out of those it is one of the few where it is not reserved for government use and has some of the oldest and most individual texts there. The world's largest book collection is, however, still in the UK and is the British library. It is the UK's national library and is estimated to have between 150-200 million publications. This may seem very approximate but it is far greater than the Bodleian due to its inclusion of stamps, databases and patents amongst other texts. Most countries have national libraries, but with the exception of the American Library of Congress, even the largest are a mere third of the size of the British library and are hardly as selective and rare as the

Bodleian.

The Bodleian building itself is split into a variety of components and reading rooms. Two constructions of primary importance are the Divinity School and Duke Humfrey's library. The latter is one of the libraries many reading rooms and is one of the most special and oldest. It holds maps, artwork and books from before 1640 as a general rule, but also has some exceptions. It is split into the Art's End, the Selden End (named after a benefactor) and the Medieval End. It is a part of the original site and has been mostly unaltered since its original conception. The Divinity School, although not technically a part of the Bodleian is still a pivotal part of its history on account of the fact that it is housed directly below the main library. It is separated into three rooms and used for a variety of purposes throughout its history included for legal court sessions, certain examinations and oral exam debates and even as an armament storage for a brief period of time. Certain ancient possessions such as Drake's Chair and the old treasury chest of the Oxford colleges.

The Bodleian is infamous in its prestige and unprecedented classification. It is most often considered one of the world's most comprehensive library and even college rivals Cambridge lack of a library of that scale (although the Cambridge University library is admirably older). Fears of electronification are often discussed in reference to the library and although for the near future it will undoubtedly continue its collection, it has been discussed whether digital archives are a possibility, especially since most every modern national publication is digitised. Personally I am rather antipathetic to this prospect but when

considering the matters of storage it may become a necessary evil in due time.

Why Do Some Rocks Glow? by Daniel McNamara



After seeing these glowing rocks at the Museum of Natural History I was curious to find out what allowed them to glow. I then found out their official name is fluorescent minerals.

So what is a fluorescent mineral? Firstly, all minerals have the ability to reflect light, and that is why we can all see them. However the minerals at the museum have the property which has been given the suitable name of "Fluorescence". What's special about fluorescent minerals is that they can temporarily absorb a small amount and instantly release it at a different wavelength. This change in wavelength causes the human eye to accept it as a different colour.

This fluorescence only occurs when a specimen is illuminated with specific wavelengths of light. UV, x-rays and cathode rays are the most well known of which. These

types of light can cause electrons within the minerals atomic structure to “Jump” up to a higher orbital within the structure of the specimen. When those electrons fall back down to their original position, a small amount of energy is released in the form of light, which we call fluorescence.

The wavelength of the new light is distinctly different. This produces the visible change of colour. The mineral’s “glow” continues as long as the mineral is illuminated with light of a suitable wavelength.

This phenomenon is particularly rare and most minerals do not have a noticeable “glow”. Only about 15% of minerals have this capability. Fluorescence usually occurs when specific impurities such as activators are present. These activators are typically cations of metals such as tungsten or lead. Rare earth metals such as terbium are also known to contribute to the fluorescence phenomenon.

Opposite to activator impurities, some impurities have a dimming effect on fluorescence. For example if iron or copper are present, they can reduce or eliminate all “glowing”. Furthermore, if the activator mineral is in excess it can have the opposite effect to the desired one.

Most minerals fluoresce a single colour. Other minerals have multiple colours of fluorescence. Calcite has been known to fluoresce red, blue, white, pink, green, and orange. Some minerals are known to exhibit multiple colours of fluorescence in a single specimen. These can be banded minerals that exhibit several stages of growth from parent solutions with changing compositions. Many

minerals fluoresce one colour under shortwave UV light and another colour under longwave UV light.

One of the first people to find fluorescence in



minerals was George Gabriel Stokes in 1852. He noted that the ability of fluorite to produce a blue glow was possible only when illuminated with light “beyond the end of the spectrum” (UV). He called the phenomenon fluorescence after the mineral and the name

quickly earned acceptance. Fluorite has such a strong fluorescent property that the observer can take them outside, hold them in sunlight. Then move them into shade and witness a clear colour change. Only a few minerals have this strong a fluorescence.

But what is the use of all this? Why should anyone care? Well, fluorescence has practical uses in mining, gemology, petrology and mineralogy. In the gas and oil industry geologists can use minerals to indicate the maturity of the oil, with darker colors indicating heavier oils and lighter colors indicating lighter oils. A mineral’s fluorescence is also handy when trying to spot small stones in sediment or crushed ore. It is also a way to associate stones with a mining locality.

There are 3 other luminescence properties worth noting. Firstly phosphorescence. In fluorescence, electrons excited by incoming photons jump up to a higher energy level and remain there for a tiny fraction of a second

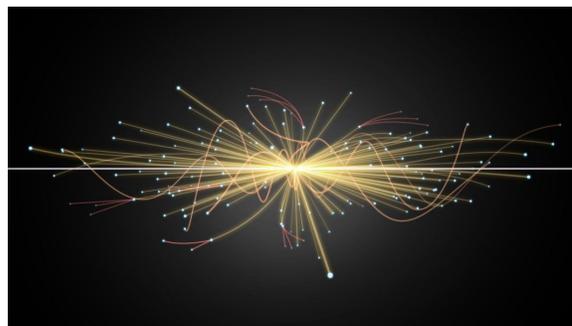
before falling back to their initial state and emitting fluorescent light. In phosphorescence, the electrons remain in the excited state orbital for a greater amount of time before falling. Minerals with fluorescence stop glowing when the light source is turned off. Minerals with phosphorescence can glow for a brief time after the light source is turned off. Minerals that are sometimes phosphorescent include calcite, celestite, colemanite, fluorite, sphalerite, and willemite.

The next is Thermoluminescence, which is the ability of a mineral to emit a small amount of light upon being heated. This heating can be to as low as 50-200 degrees celsius.



Finally, triboluminescence is the ability of some minerals to emit light when mechanical energy is applied to them. These minerals glow when they are stuck, crushed, scratched or broken. This light is a result of bonds being broken within the mineral structure. The amount of light emitted however is very small and careful observation in the dark is often needed to see it.

Physics: A Summary of Prof. Ian Shipsey's Talk by Ashwin Tennant

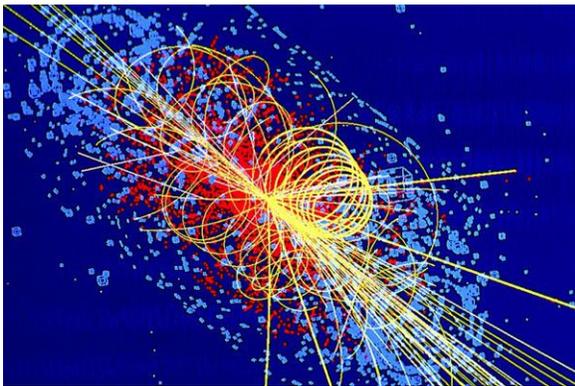


The foundations of particle physics were first established in the late 20th Century with the proposition of the Standard Model: which represented all of matter in 17 fundamental subatomic particles (as well as their 17 antiparticles).

These particles are split into 12 fermions and 5 bosons. Fermions are particles which can join together to create all matter. They all have a specific mass and charge. The 12 fermions can also be split two ways, 6 are leptons and 6 are quarks (leptons are not affected by the strong nuclear force which holds protons and neutrons together in the nucleus). They can also be split into 3 groups of 4 particles known as generations. The corresponding particle in each generation possesses the same properties but has a mass hundreds or thousands of times greater.

The first generation consists of the smallest, yet most stable molecules (meaning they do not decay into other fundamental particles). These are the up and down quarks, and the electron and electron-neutrino (leptons). Up and down quarks are what make up protons

and neutrons (UUD for protons and UDD for neutrons). Up quarks have a charge of $+\frac{2}{3}$ and down quarks $-\frac{1}{3}$ hence protons have a charge of +1 and neutrons are neutral. Electrons have a charge of -1 and neutrinos are neutral. In the second generation we find the charm and strange quarks (charm corresponding to up quarks and strange to down), and the muon and muon neutrino leptons. These all have exactly the same charge (and behave in the same way) as their corresponding particles in the first generation but are all roughly a few hundred times heavier.



The final generation consists of the top and bottom quarks, and the tau and tau neutrinos. The 'tau' leptons are 3600 times heavier than their first generation counterparts but the top and bottom quarks are each 100,000 times heavier. Their high mass makes them very unstable meaning they are likely to decay after a very short time. The other 5 particles are bosons. 4 of these are gauge bosons: these can be thought of as 'force carriers', each are quanta of energy which fermions can be thought to 'transfer' to release or gain energy. The 'gluon' is responsible for the strong nuclear force as it 'glues' the proton and neutron together. Photons are responsible for the transfer of light (or the electromagnetic force).

Finally W and Z bosons are responsible for the weak nuclear force which is responsible for nuclear decay. Gravitons (responsible for gravity) are only theorised. The final fundamental particle was recently discovered by the Large Hadron Collider in 2013. The Higgs boson is the carrier of the Higgs field (in the same way a photon is the carrier of an electromagnetic field). It permeates all space and when a particle interacts with it, it slows down as its kinetic energy is being concentrated into mass. This is why there are three distinct generations of fermions.

However, the boson does not affect photons or gluons which is why photons travel at a constant speed (the speed of light). Without the higgs field, all matter would simply be energy moving at the speed of light and atoms could never have formed.

Cosmology

Despite being at opposite ends of the physics spectrum, cosmology and particle physics have recently become very interconnected.

Cosmology first became an interesting area of study when a physicist named



Edwin Hubble noticed that using the doppler effect (the stretching of light waves from distant stars or galaxies due to recession) that almost everything in the universe is moving away from

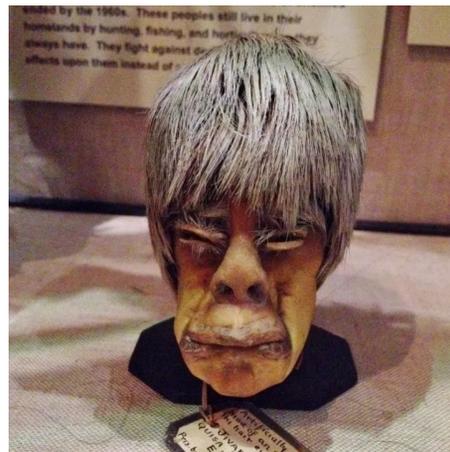
us. He also noticed that the velocity of the recession was proportional (so a galaxy twice as far away as another was receding at double the speed). From this he deduced that the universe was and always has been expanding. From this, scientists had to work out whether the rate of this expansion was increasing or decreasing. The first step towards solving this problem came with the discovery of dark matter. In a typical orbit (such as for planets around the sun) a space body further from the centre will move at a lower velocity. However, it was discovered that all stars orbiting the centre of a galaxy do so at the same, constant velocity meaning that there must be extra matter which cannot be observed holding the galaxy together, and this 'dark' matter would constitute more than 5 times the amount of visible (baryonic) matter. This extra mass would suggest that the expansion of the universe is being held back, so would eventually stop. However, by drawing graphs of distance against velocity for supernovae (which are very bright so their colours and doppler shift can be seen from very far away) scientists actually worked out that the universe's expansion is accelerating. The unknown factor which is pushing the universe apart has been called 'dark energy' or the cosmological constant. It exists because the energy of empty space is not zero. Empty space has been shown to contain virtual photons and virtual electrons which can exist for short periods of time as the rules of quantum mechanics allow for energy or mass to be 'borrowed' as long as it is eventually returned. Evidence of virtual particles was first seen in a phenomenon known as the 'Lamb shift' which showed that the absorption lines of a hydrogen spectrum from most nearby stars were slightly shifted due to interaction

with these virtual particles. Dark energy can also continually be deposited as the universe expands, so the total percentage is steadily increasing. This has led to many new hypotheses about how (or perhaps if) the universe will end, as the acceleration of expansion could continue forever.

From the Pitt Rivers: A Model of a Mongolian Temple, and Some Shrunken Heads by Will Wakelam

I was especially intrigued by two artefacts from the museum: the Shrunken Heads and the model of a Mongolian Temple. I found out a lot about the background of these items and I would like to share this knowledge.

The Shrunken Heads in the museum originally came from the Upper Amazon region of South America between Peru and Ecuador. It was



immensely fascinating to learn how, in many cultures, the taking of heads from enemies has been a socially approved form of violence that involves deep religious and cultural meanings. A positive outcome of the taking of heads from enemies is that it has been a way of

maintaining social order and as a result not just murder. The Shrunken Heads on display in the museum were made by the Shuar and Achuar people however the practice of taking and shrinking heads is no longer occurring nowadays as this had ended by the 1960s. Historically, the purpose of taking heads from enemy soldiers was to capture souls and then harness their power in order to benefit their own people. In addition, after contact with Europe, Shrunken Heads also became beneficial for trade and they were often exchanged for items such as guns and metal goods. Something else that is highly interesting is the complex method that was used to develop these Shrunken Heads. The process began with the skinning of the heads and then the discarding of the brain and the skull took place. This was followed by the immersion of the skin in hot water and then hot sand was poured in. This treatment with the hot sand was repeated several times over a period of months and facial features were moulded by hand after each treatment. In order to close the eyes and mouth, cotton string was used in the process and then finally a spiritual action was included as the face was blackened with vegetable dye to prevent the soul from escaping and taking revenge on its killer. It is not known exactly when the tsantsas came to the Pitt Rivers Museum however it is believed that they came between the years 1871 and 1936. Interestingly, as a result of demand for shrunken heads by museums and private collectors, many counterfeits were made however these were instead produced from animals such as monkey or goat heads, whilst some were also made from human heads.

The second item that I had time to take a detailed look at was the model of a Mongolian Temple.



The model in the museum is a 1:20 scale model of the temple Megjid Janraisig in Ulan Bator and it was created out of painted wood and gilded plaster of Paris. Once again, I found this item a highly impressive creation and I was interested in looking into some background information about this temple in Mongolia. The model of the temple was made by the Monumental Arts Corporation of the Union of Mongolian Artists in 1992-93 and it is known the principal artist in this creation was called Namnandorj. However, the actual temple was built in 1912 due to the request of the eighth Khutuktu, Bogd Gegeen, who was both a religious and political leader. Bogd Gegeen was a key political figure in Mongolia as he led the National Liberation Movement for Mongolian Independence. As a result, the temple was built in order to act as a cryptic symbol of the country's independence from the Manchus. The temple's name originates from the deity whose statue stands in the middle of the temple. Today, restoration of the temple is taking place as part of a much wider revival of Mongolian Buddhism and Mongolian Culture and the model of this temple was created in order to inspire this general process

whilst it also shows how the temple will look once this restoration has been completed.

Bee Colonies by Will Taylor

The following guide was inspired by a display at the Museum of Natural History.



Eggs and Hatching:

The queen bee can lay up to 2000 eggs in a single day- especially in her youth. These eggs will hatch into a worm like form, aka a larva, after 3 days in the hexagonal* wax cell it was born in. For a worker bee to be born, it is fed on a special compound called royal jelly from a worker bee, for just a few days. This is the same timing as for a male drone, however the drone egg is unfertilized. For a queen to be born, it is fed on this substance throughout its early development. The larval stage lasts for about 6 days, but is longer or shorter depending on the desired bee. After this, the cell is capped in wax and the larvae cocoons itself. The next stage is known as the Pupa stage and lasts 7 to 14 days depending on bee type (shortest for queen and longest for a drone). The bee now chews its way out of its wax cell and is born into the hive.

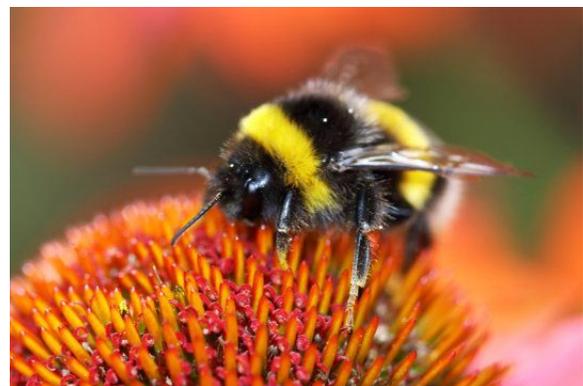
Life of a Worker Bee:

The female worker bee lives usually for around 130 days, until dying of fatigue. The worker bee spends her first months in the hive doing

various vital jobs. These include feeding and tending to the larvae in the nursery with royal jelly and honey in the first couple of weeks of their lives. They also process the incoming nectar, then make the honey and cap it with wax. Workers are often seen to fan the wax to cool and set it after building the cell. They may also be required to feed the queen bee. When the bee is older, she is required to leave the hive to collect necessary resources such as nectar and pollen. They can often be seen to dance after flying back to the hive. Just simple movements can show the direction and distance of the food source.

Life of a Queen Bee:

A queen starts her life after escaping her wax cell. Her first job is to go around the hive and sting and kill any other queen cells; there can only be one queen per hive. The main role of the queen bee is to lay eggs. In her 3 to 4 year life she may lay as many as 600,000-800,000 eggs (1,000-1,500 per day in the honey production season). She is the only one of her kind in a hive which may number 60,000 or more bees, making her unique. Although she sits at the top of the hierarchy, the worker bees have the power to raise a new queen, or kill one on demand. They also choose weather or



not to accept a new queen.

Life of a Drone Bee:

Drones have no stinger, or ability to collect pollen/nectar, so their only job as a male is to mate with the queen bee. This is also the only bee to come from an unfertilized (haploid) egg, sharing all its DNA with its mother. On a mating run, the queen mates with 10-20 drones out of thousands from multiple colonies. Because of this great genetic diversity of the sperm, the eggs are also genetically diverse and the colony is more resistant to diseases. The drone dies either after mating with the queen, or after it is kicked from the hive in the winter, when it serves no purpose to the hive. Although being generally lazy when it comes to work in the hive, they may flap their wings to help cool the area.

Pheromones:

Honey bee pheromones are one of the most advanced ways in which any insect communicates. Bees use pheromones to communicate multiple important messages quickly and effectively within the hive (along with vibrations on the hive, and dancing). The two types of pheromone are primer and releaser pheromones. A primer will prompt a complex reaction in the receiver, operating at a physiological level and stimulating both developmental and behavioral responses within the receiver. The queen can use these signals. A releaser will have a less strong and short term effect on the behavioral level. Worker bees can use these signals. The most important pheromone may be the 'Queen Mandibular Pheromone', or QMP. It plays a role in the suppression of egg laying in workers, attracting drones on mating runs, and is essentially a reassurance and well-being

message to the bees. Other pheromones indicate danger, brood development within the hive, an egg's mother, the location of the hive, and the presence of foragers (which halts production of nurse bees to keep the correct ratio).

Winter:

When the winter comes the hive must make a sacrifice to survive. It must kill or expel all drone bees, who now serve no purpose as the queen is not laying eggs. Bees then often come together in a large formation (a spherical lattice around the queen), which slowly rotates around the hive. As the bees need energy to keep warm and survive, they will uncap and drink the rations of stored honey in the hive. Some hives may consume up to 30 pounds of honey in the cold months as they go into this hibernation. Alternatively, it is only the queen bee who will survive the winter, and who after mating, gorges on honey and hides underground to sleep. If she is still alive, she will start or find a colony to lay eggs into. Only half of the queens will survive the winter like this.

*In 1998 TC Hales wrote a mathematical proof proving that hexagons are the most efficient storage system, whilst bees have been living for 100 million years using this simple lattice structure to store honey...

Torn down through revolutions of justice,
Stand open and free for all to benefit.

Knowing by Johan Nerlov



Its tall walls guarded a secret,
A secret seldom seen outside its hallowed
circles.

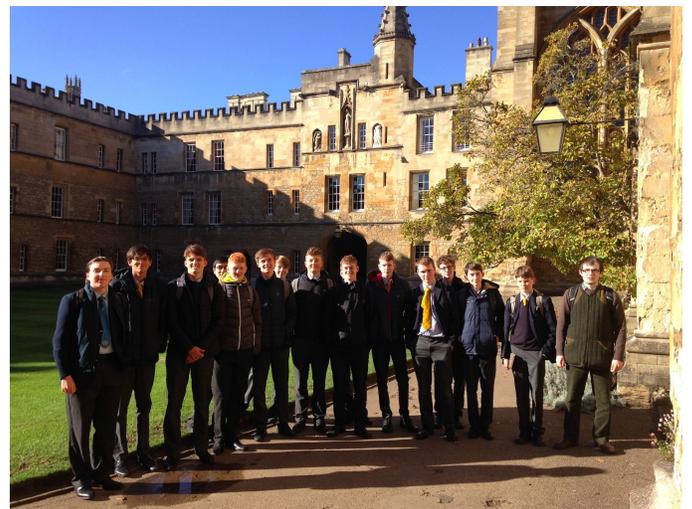
These walls, towering walls,
Scarred by the passage of time,
Have warded off many an uninvited guest
throughout their time.

At first a dark and mysterious cell,
It grew and blossomed,
Then, as knowledge itself began to bloom
there
Arose a cathedral to its art
And, yet few and far between, those
Who professed their love to it rejoiced.

But, soon its very existence,
As quickly taken as given,
Hanging - precariously -
Was only saved by one who'd
Once himself been given wings by its
Fountain of wisdom

Time, as it does, moved on and on.
And, as it reluctantly kept pace,
This very temple to wisdom and hall to truth
Did begin to aid both the lay of men and the
greatest of Kings.
And, at last, its once unassailable barricades,
Gargoyles to the masses,

*Brought to you by the 5th Year
Academic Scholars:*



(This was taken at the end of our
tour of New College; pictured to the
right is Anthony Bracey OA, now
student of New College)