The Smeatonian Society of Civil Engineers

Archive compilation of the scripts and illustrations used for the 250th Anniversary virtual gathering at the Kings Head Tavern, Holborn on the evening of 15th March 2021, marking the first meeting of the Society on 15th March 1771

A report of the meeting was posted on the Society's website. It is appended to this document. This compilation includes full texts that were too long to include in that report.

The Meeting on 15th March 2021

The calling notice for the meeting included the following:

Dear Member

A virtual gathering on 15th March 2021 to celebrate the 250th anniversary of the Society's first meeting.

The Smeatonian Society focuses on issues of the moment and of the future. It does not dwell on the very many historic achievements of its members or its history as the first engineering society, except in its enduring toasts and sentiment. However, on the 250th anniversary of its formation, I invite you to join me for a reflection on that historic first meeting.

As the venue of the first meeting, the King's Head Tavern in Holborn, was demolished a long time ago, I originally thought that I would suggest a small informal gathering at an old pub in the same part of London, perhaps the 17th century Ye Olde Cheshire Cheese. With the coronavirus restrictions, we'll have to make it a virtual gathering, and the upside of that is that I can invite all of you to join me.

The plan is to meet at 6pm (with Zoom log-in from 5:45). You will be introduced to the King's Head Tavern, and why it was chosen for the first meeting in 1771, as well as who the members present at the first meeting were and what they were known for at the time. We will conclude with toasts at around 7pm after a time for members present to add any of their own comments.

I hope you would like to attend, and if so, please respond as indicated to Rod Muttram. This event will be for members only.

The Zoom invitation link will be sent only to those who have registered. This will be accompanied by a brief guide to the drinks that would have been offered at the King's Head in 1771, so that you can enjoy some appropriate refreshment during this hour and be well prepared for the toasts.

Kind regards

Chris Price

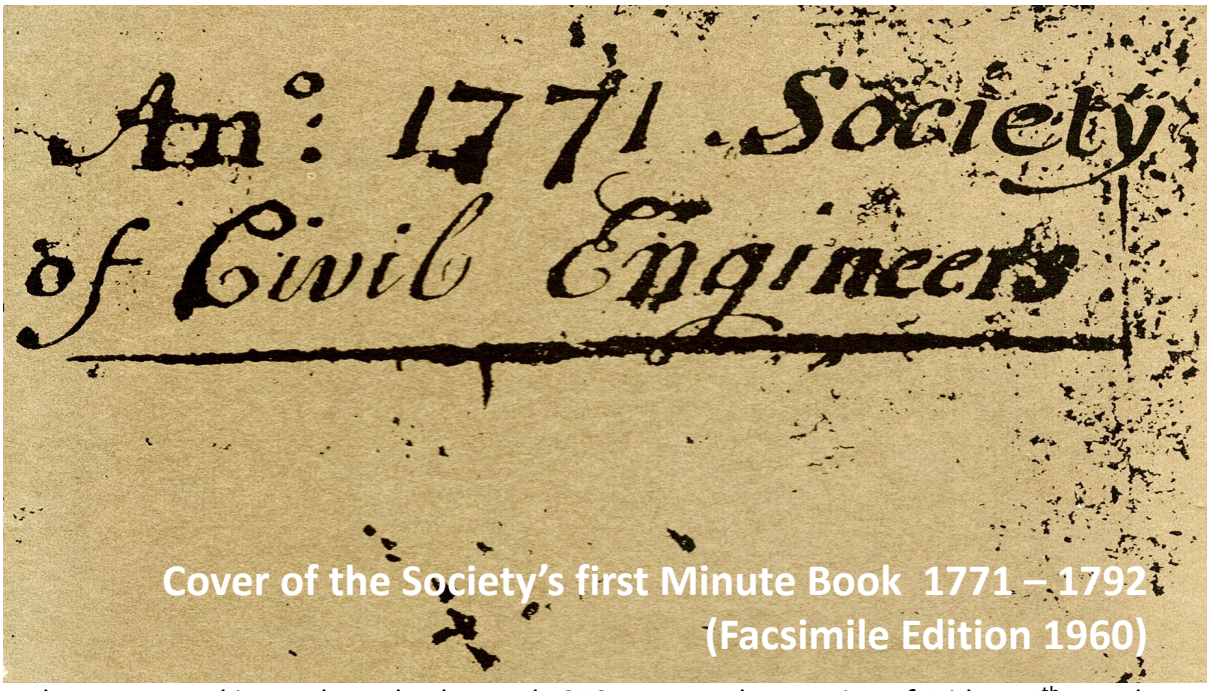
On the evening, members gathered prior to 6pm on the Zoom web conferencing system and were joined by Her Royal Highness The Princess Royal, President of the Society, at 6pm.

HRH opened the meeting and introduced Mr Chris Price (CP), former Honorary Treasurer of the Society, who had originated the idea of this gathering, and handed over to him.

After thanking HRH, CP continued:

"As a responsible Producer, I should point out that our story this evening describes real places, real events and real people.
Unusually for Engineers, it will include a little Artistic Licence."

"Now, I'm having a bit of difficulty with the Technology.
I have shown the Time Machine this copy of the 1771 Minute Book



Cover of the Society's first Minute Book 1771 – 1792
(Facsimile Edition 1960)

and programmed it to take us back exactly 250 years to the evening of Friday 15th March 1771 when John Smeaton and 6 of his associates met at the King's Head Tavern in Holborn and agreed to form The Society of Civil Engineers.

I'm getting an Error Message.
"Location not found" and by way of explanation it says:
"Web Data Ambiguous".

Now, I can sympathise with that because when I was researching this, I found that the sparse data that there is on the web is somewhat muddled.
Let me show you.

Here is Holborn in the late 1700's

Today's records show that there were about a dozen "King's Heads" in London at the time.

In many ways the most obvious was the one at 142 High Holborn.

It is prominent in the "PubWiki" list with several attached references.

It was just 3 minutes' walk from where the current Holborn tube station opened in 1906.

Despite its High Holborn address, this King's Head was in Bloomsbury, rather than in the administrative district of Holborn. So perhaps it wasn't the one.

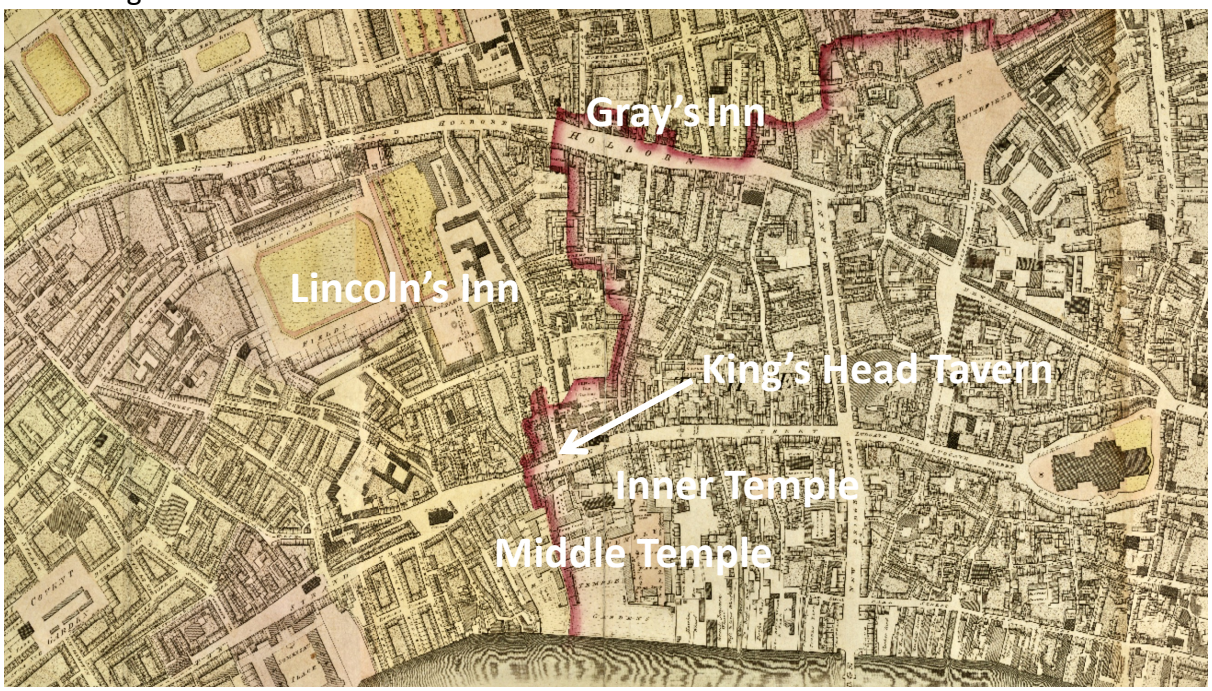
Also, it was an "Ordinary" public house rather than a "Tavern".

The terminology of Inns, Taverns and Ordinaries was strictly applied. Taverns were described as places of business where food and alcoholic beverages were served, and their number was initially limited to 40 in London.

That was in 1553 and the King's Head that I was looking for was one of them.

Inns were Taverns that were licensed to put up guests.

The district of Holborn stretched down to the Thames.
Surprisingly, our King's Head Tavern doesn't feature in the PubWiki list.
Hugh Ferguson told me that he thought it was at Chancery Lane End, where Chancery Lane meets Fleet Street.
Biographical entries on Samuel Pepys, that I found, confirm this and provide additional interesting information.



We can see how well-placed it was, between the Inns of Court where the Engineers were working with their lawyers on agreements and parliamentary bills to enable their infrastructure projects to go forward.
Fleet Street was the main land route between the cities of London and Westminster, making this an ideal meeting place.

I have now loaded this map into the Time Machine, and it's "Processing".
I'm seeing a picture emerging of an 18th Century Landlord whose hair is even longer than mine.
I wonder what his excuse for that is!
Anyway, we have arrived, and at exactly the right moment because here is Mr Pierce, Landlord of the King's Head Tavern, and he is on the point of welcoming the Engineers.

"Good evening to you, Mr Yeoman, Mr Smeaton and your fellow Engineers, and thank you for booking our private dining room for your meeting and dinner this evening.
I see that you're all well-supplied with your drinks, so **Cheers!**
Mr Smeaton, you said you hoped you would need a regular booking and can assure you that your group will be most welcome.

Some of you might be surprised what an appropriate venue you have chosen.

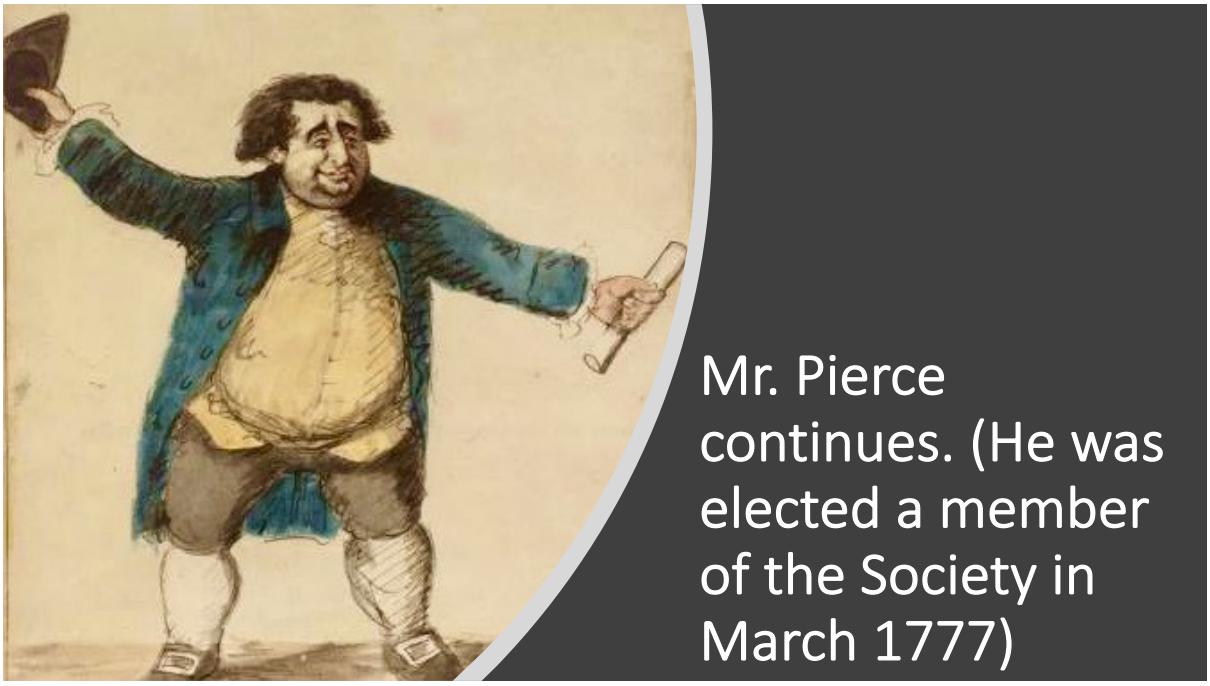
This picture isn't quite accurate today as it won't be painted until the end of the 1700s after our tavern had closed and before the building was demolished in 1799.
It lacks our tavern sign, which today depicts King Henry VIII.
Otherwise, it's a good likeness.

The tavern occupies the first and second floors, above two shops one of which is the bookshop where the first edition of Isaac Walton's famous book The Compleat Angler was printed and sold in 1653.

You will be more comfortable and quieter up here than in the main room on the first floor.

Up here we have more respectable surroundings with these copies of contemporary portraits of our King and Prime Minister.

They could use your moral support if you decide to use the customary toast at the end of the evening as they're struggling to raise the funds to repay the costs of the recent Seven Years War with France, and their tax demands are upsetting the colonists in America.



The history of the King's Head Tavern goes back 300 years to 1472 in the second reign of King Edward IV.
This was in the Wars of the Roses, and the Crown was changing heads very frequently, so I can't tell you which king's head was on the original sign.

The noted 1660s diarist Samuel Pepys records one particular visit here.
He had met Lord Brouncker, first president of the Royal Society, and after being forced to subscribe £40 to the building of a College recounted:
"*Thence with my Lord and several of them to the King's Head Taverne by Chancery Lane, and there did drink and eat and talk."*
He heard Mr Hooke and Lord Brouncker account for the reasons for "concords and discords in music" but was not immediately convinced.

In 1666, fortunately, the Great Fire of London stopped its westward progress just short of the tavern.

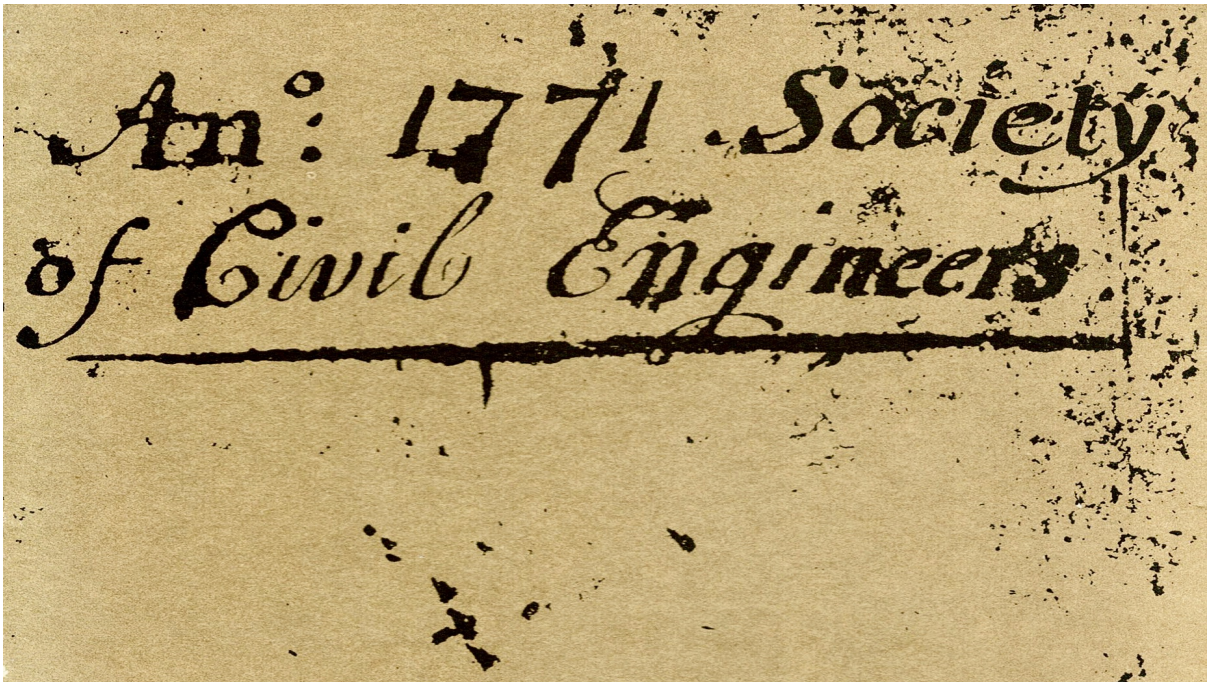
After a decade when the tavern was the venue for meetings of the notorious anti-Papist "Green Ribbon Club", Pepys was back.
Now as President of the Royal Society he joined Robert Hooke and other Fellows who regularly met at the King's Head, including occasions when they drank, dined and discussed lectures that they had attended at Gresham College.

So, Mr Yeoman and Mr Smeaton, as Fellows of that same Royal Society, as well as having regular business in this part of London, you have chosen the most appropriate place for your Group of the country's leading Engineers to meet and to dine.

I see from your choices for this evening, that you will eat quite modestly but I can offer you a fine menu, both for your ordinary meetings and for any celebration you may plan, perhaps for an anniversary of this occasion.

Here we are perfectly placed, within a mile of Smithfield and Covent Garden and just over a mile from Billingsgate where supplies of local salmon, tunny fish and oysters are plentiful.
Their English Lobsters are wonderful value as they are so numerous at the moment.
I know that there is talk about the poor quality of meats from Smithfield, but I can assure you that my butcher there sends me only the best mutton and beef for your main courses.
From Covent Garden we have all manner of home grown and imported fruits including the luxurious pineapple from Spain.
Everyone says that it's thanks to your Eddystone Lighthouse, Mr Smeaton, that imports are so much more reliable.

Saving the best until last, I must mention our famous White Soup which will be part of your dinner this evening.
Ours is made from veal stock, cream and almonds, thickened with breadcrumbs.
I consider this soup to be a real tonic and recommend it to all our guests.
If you take my advice, you will always include a soup course in your dinners together."



Thank you, Mr Pierce.

I have put the Time Machine on Pause for a moment.
Before we are introduced to the Engineers who joined the Society in 1771, you may be wondering what is on the site of the King's Head today.

George Attenborough
& Son
Jewellers
193 Fleet Street

It is a jeweller, and it is famous for a big jewellery theft this month two years ago when Fleet Street was full of runners in a Half Marathon.

Members Elected in 1771:		Introduced by:
March 15th	Thomas Yeoman	James Whiteaway
	John Smeaton	Paul Jowitt
	Robert Mylne	Hugh Ferguson
	John Grundy	Peter Hansford
	Joseph Nickalls	Michael Purshouse
	John Thompson	
	J King	
March 29th	John Golborne	Tony Roche
	Robert Whitworth	Andrew Wolstenholme
	William Black	
April 2nd.	Hugh Henshall	David Johnson

This is a list of the eleven who joined the Society on 15th March 1771 and at the only other meetings that year, just two and four weeks later.
We will not meet or hear about three of them because they did not continue to attend meetings and play an active part in the Society.

My volunteer collaborators this evening have kindly agreed to introduce these original members in much the same way as new members now introduce themselves at the first meeting they attend after election.

As far as possible, these introductions will be true to 1771 rather than as retrospectives on their whole careers.
Some will be in-person introductions.
So, releasing the Pause button, we're back in 1771 and first, Thomas Yeoman."

James Whiteaway introduces Thomas Yeoman

Gentlemen, I would like to introduce myself, Thomas Yeoman. I was born in Somerset in 1709, and I am 62 years old. I will in a moment summarise my skills in engineering, but firstly set our meeting into some perspective.

We have today, Friday 15th March 1771, gathered in the King's Head Tavern in Holborn with the objective of forming the Society of Civil Engineers. I am honoured that you are considering me for election as the first president of the Society. The objective of the Society is to have good conversations concerning our skills and for pleasant social interaction, and not so much to be a learned society.

It is appropriate that this hostelry is named after our monarch George III (pictured behind me) as we may wish to include him in the toasts at our meetings. He is after all the first Hanoverian monarch to be born in England and to speak English as his first language.

Now is an excellent time to be an engineer as their skills are becoming more and more important to society. London was of course severely damaged by the Great Fire more than 100 years ago now, and engineers played a significant role in rebuilding it (see picture behind me).

My personal skills were developed firstly as a wheelwright (see behind me). I was then recruited by Edward Cave to operate a water-powered cotton roller-spinning mill at Northampton in 1741. I established myself then as a millwright (see picture behind me). I went on to construct ventilators, taking an active part in Northampton's business. These machines were important in improving the conditions in coal mines which often had a suffocating atmosphere due to the presence of choking coal dust. Ventilators were also used on ships of the fleet.

My wider contributions to society included presidency of the Northamptonshire Philosophical Society, and being a member of the Baptist Church in Northampton.

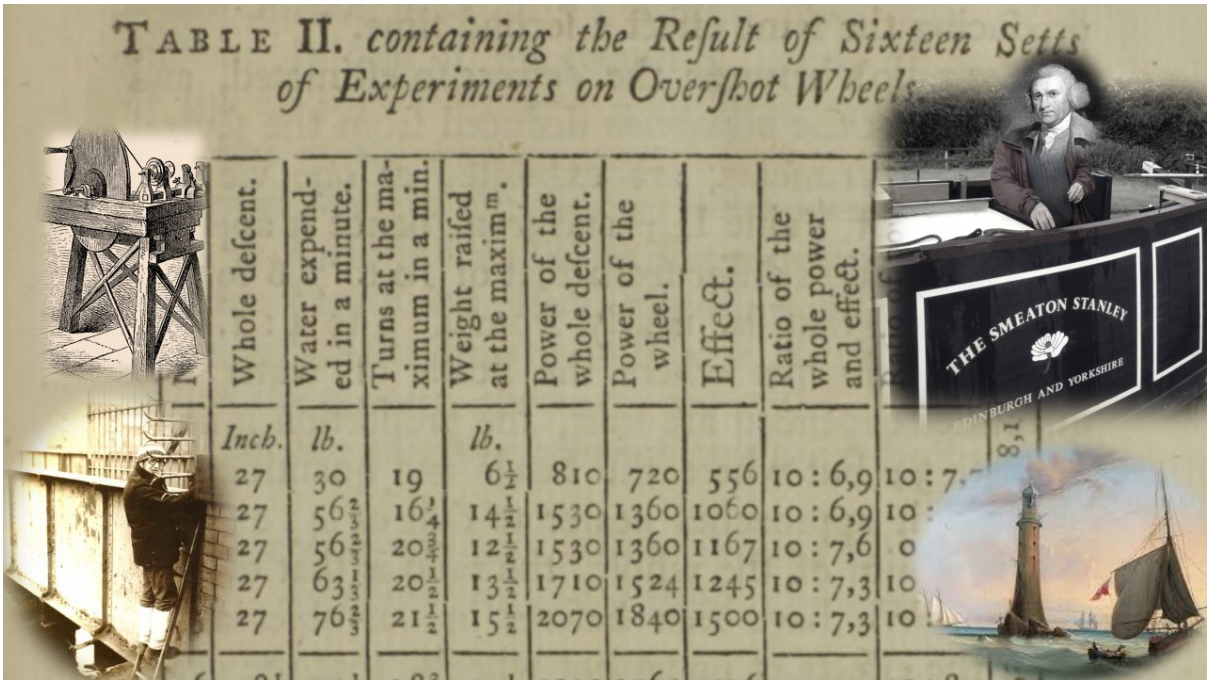
More recently, as my business flourished, I moved to Gold Street where I built and sold scientific instruments, and then to Bridge Street in Northampton, as many of you will know.

In 1744 I surveyed the River Nene which flows from near Northampton into the Wash. I subsequently worked as a surveyor and engineer on many canal and river navigations including the River Stort, Lea, Chelmer, Medway and Thames. I also worked as an assistant to John Smeaton, with a major achievement being the Limehouse Cut which allowed shipping to avoid the sinuous lower reaches of the River Lea. I was elected a Fellow of the Royal Society in 1764.

Given my close connections with John Smeaton, it is therefore very appropriate that I now hand over to him so that he can introduce himself to your good company.

Thank you.

Paul Jowitt introduces John Smeaton



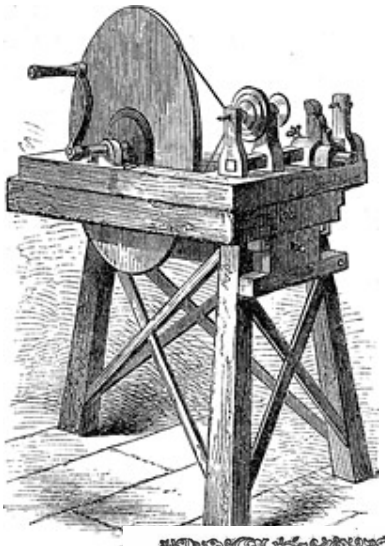
Good evening, Gentlemen. And some Ladies too, I see!

My name is Smeaton, John Smeaton

I was born in 1724, at Althorpe Lodge, near Whitkirk in the West Riding of Yorkshire.

As a young man I liked “engineery” things. I made my own lathe, and was inspired and encouraged by Mr Henry Hindley, the well-known clock and instrument maker in York.

But Father wanted me to follow him into the Law, so in 1742 he sent me to Grays Inn.



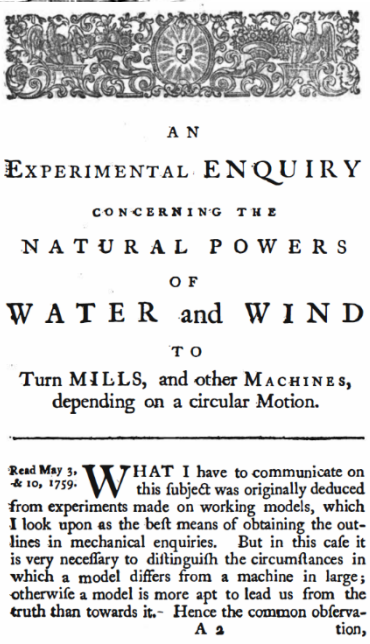
I returned to Althorpe in 1744, and convinced Father to let me pursue an apprenticeship with Mr Hindley at his workshop in Petergate. And in 1748, I set out for London to set up as an instrument maker, with premises in Great Turnstile off Holborn, and later in Furnival Inn Court.

I was able to attend meetings of the Royal Society in the Strand and present a number of papers. I was elected as a Fellow in 1753.

In 1752 I embarked on an extended study of windmills and water mills. I was helped greatly by the work of my friend, Mr Rouse, an ingenious gentleman of Harborough in Leicestershire.

In 1754, I spent 5 weeks in the Low Countries, studying various drainage and mill works. It was the turning point of my career.

In 1759, I read a Paper to the Royal Society on 3rd and 10th May, entitled “an experimental enquiry concerning the natural powers of water and wind to turn mills and other machines, depending on a circular motion.”



AN

EXPERIMENTAL ENQUIRY

CONCERNING THE

NATURAL POWERS

OF

WATER and WIND

TO

Turn MILLS, and other MACHINES, depending on a circular Motion.

Read May 3, & 10, 1759. WHAT I have to communicate on this subject was originally deduced from experiments made on working models, which I look upon as the best means of obtaining the outlines in mechanical enquiries. But in this case it is very necessary to distinguish the circumstances in which a model differs from a machine in large; otherwise a model is more apt to lead us from the truth than towards it.- Hence the common obferva-

A 2 tion,

It was well received, and subsequently, I was awarded the Copley Medal. The fundamental finding was that for water mills, the power effect is nearly as the square of water velocity. This was in accord with the “vis viva” energy principle - proposed by Gottfried Leibniz in Germany.

But it led to some conflict with members of the academic establishment, who believed it was inconsistent with Newton's idea of “quantitas motus” – the constancy of Momentum.

One day these concepts might be reconciled.

In 1756, the President of the Royal Society recommended me to build a new lighthouse on the Eddystone Rock.

My design had dovetailed granite blocks and marble dowels, assembled to resemble the trunk of an oak tree.

I also used hydraulic lime, which would set under water.

The light was first lit in October 1759.

I also undertook a number of harbour and maritime works, from St Ives and, most recently, in Aberdeen.

In 1756, I was invited to survey a canal, to extend navigation along the River Calder and Hebble Brook, from Fall Ings Cut in Wakefield, to Halifax.

Construction started in 1759. By 1764 the navigation had reached Brighouse.

Our eminent friend, Joseph Nickalls, was my resident engineer in this endeavour.

I was involved in various drainage works throughout the kingdom. The first was at Potteric Carr, by Doncaster in 1862.

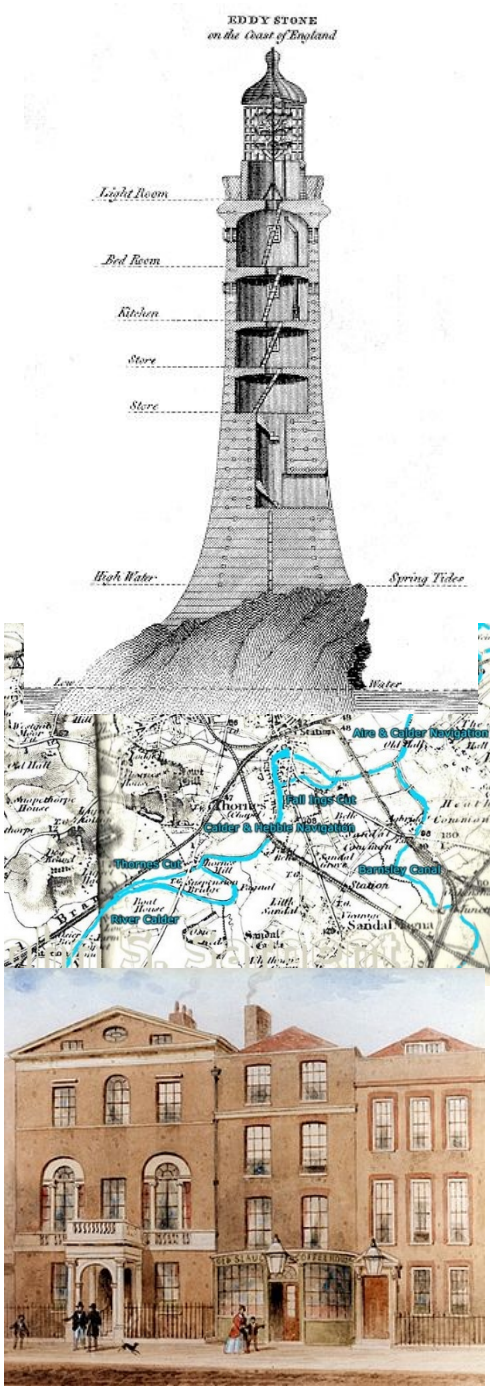
In the course of my work, I became acquainted with members of the Lunar Society in the Black Country.

I was asked by Mr Boulton about a mill, to power his Snow Hill Manufactory. And occasionally, I would meet him and other Lunar Men in Slaughter's Coffee House on St Martin's Lane.

By profession, someone once said, I was a Civil Engineer.

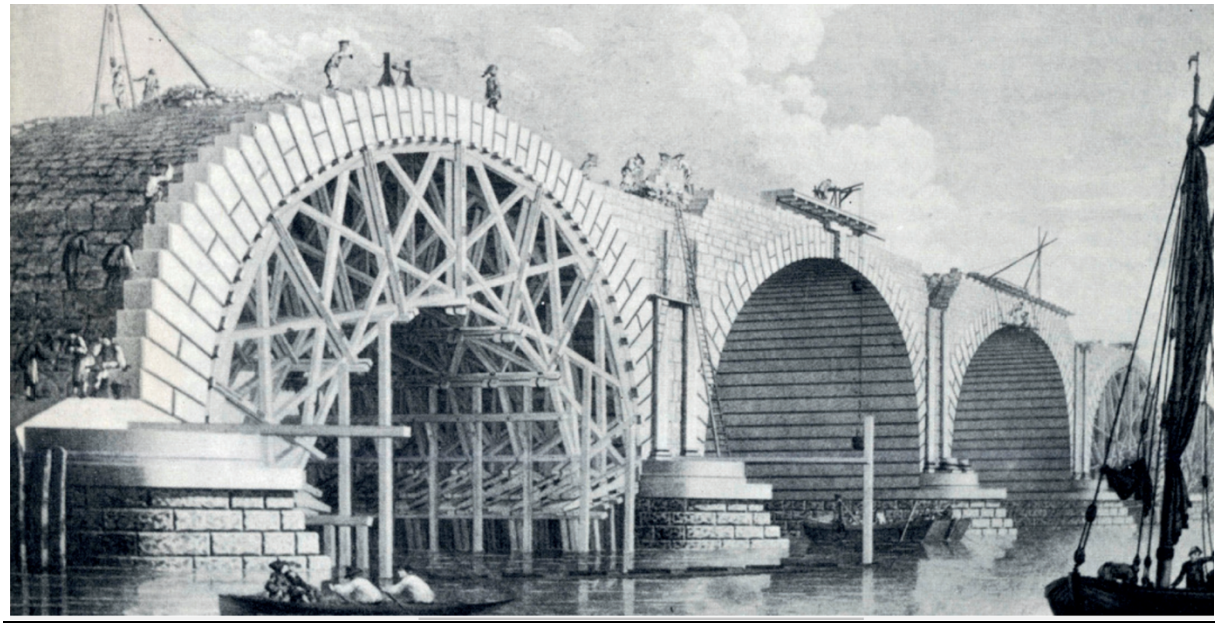
In fact, I think it was me…

Aha! Good evening Mr Mylne!



During Paul Jowitt's presentation (he was in period dress) his landline telephone rang and he remonstrated with it saying that it should keep quiet and not interrupt him as it had not been invented, and would not be for the next 100 years.

Hugh Ferguson introduces Robert Mylne



Good evening.
My name is Robert Mylne, and I come from a long line of Scottish master masons and architects. Since 1481, six of the family, including my father and brother, have held the office of Master Mason to the Crown of Scotland. My late father was City Surveyor of Edinburgh, where he had an extensive architectural practice.
After my apprenticeship, I spent four years travelling and studying architecture in Europe, culminating in the Silver Medal for architecture in the prestigious Concorso Clementino in Rome – the first Briton to do so - which helped establish my reputation. On returning to London in July 1759 I discovered that the City authorities were advertising for designs for Blackfriars Bridge, the first over the Thames within the city since Old London Bridge. I was delighted when mine was chosen from some 50 entries – including that of my good friend John Smeaton.
My design may have been chosen for its architecture, though it also included innovative engineering including the first use of elliptical arches in Britain. But the greatest challenge came after I was appointed as Surveyor for the construction - supervising everything from purchase of properties and laying out approach roads to managing contractors for the foundations and masonry in the treacherous tidal waters of the Thames – as you can see from the illustration behind me. It was opened two years ago.
Blackfriars Bridge provided a platform for two parallel careers. As an architect my buildings include Tusmore House in Oxfordshire, and the City of London's Lying-In Hospital is now under construction, and I have been appointed as

surveyor for both St Pauls and Canterbury Cathedrals. As a bridge engineer, I have built one and been consulted on several others.
Now I am developing a third career, as a hydraulic engineer. I started with advice to the London Bridge Waterworks, which operates waterwheels through several arches of the bridge to pump water to the City, and to the New River Company which brings water by aqueduct from springs in Hertfordshire to central London. Four years ago the New River Company appointed me as joint surveyor at a salary of £200 per year. Having a salaried position with an employer who allows me to pursue my private work as well is a great comfort.
I am well aware of what people say about me, that I am arrogant and high-handed. My family in Scotland think me imperious: my brother William calls me 'His Honour of London'. Even one of my workmen referred to me as 'a rare jintleman, but as hot as pepper and as proud as Lucifer'. But I am sure in this company you will find a genial companion who will foster the interests of this Society for years to come.
I was married a few months ago, and we plan a large family. I hope one at least will follow in my career and – who knows – my son and grandson could be leading lights in this Society for a century or more to come*.

*Robert Mylne was Hon Treasurer 1793-1811; his son William Chadwell Mylne 1822-1863; and William's son Robert William Mylne 1864-1882.

Peter Hansford introduces John Grundy

Good evening. Allow me to introduce myself.

I am John Grundy. I hail from Lincolnshire, where I was born just over half a century ago. My late father was also a John Grundy, quite a renowned mathematician and land surveyor in his day, and one of the first people in this country to practice in what we would all now call civil engineering.

So, I have had a keen interest in civil engineering all of my adult life, having been trained and mentored for this calling by my late father. I'm proud to be known in the field as "John Grundy of Spalding, Engineer".

My career to date has been entirely focused on surveying, protecting and improving the great rivers and drainage courses of East Anglia, as well as repairing sea defences in HAZE-BRUH on the North Norfolk coast. I've worked extensively with the rivers Trent, Humber, Witham, and Hull and I've prepared numerous hopefully authoritative reports, notably for the Earl of Lincoln and the Duke of Ancaster.

I must say, I'm no stranger to the assembled company this evening. Indeed, I've collaborated with none other than Mr Smeaton here on improving navigation on the River Witham between Boston and Lincoln and for drainage of the adjacent Fen. A report that I prepared jointly with Mr Smeaton and Mr Langley Edwards resulted in a Bill being laid before Parliament some nine years ago, seeking authorisation to shorten the river course between Boston and Chapel by over two and half miles. This scheme also included the mighty Grand Sluice and navigation lock at Boston, which I'm proud to claim as being the largest structure of its kind in this country, which we completed just five years ago – if I say so myself, a triumph of navigation engineering.

In the last few years, I have been directing the design and construction of new main drains and raising banks on the River Hull, again in collaboration with Mr Smeaton, and more recently supervising construction of the Driffield Navigation in the East Riding of Yorkshire. This magnificent 11-mile waterway was completed in May of last year, 1770. I'm now turning my attention to drainage in the Wisbech area and to dock facilities in the port of Hull. I foresee Hull as turning into being a major port in the coming years.

Gentlemen, I, John Grundy of Spalding, am honoured to join you in this new Society of Civil Engineers.

Now let me pass over to Mr Joseph Nickalls here.

Michael Purshouse introduces Joseph Nickalls

Thank you…
Let me introduce myself: Joseph Nickalls Esq, I'm a Londoner. I originally trained as a millwright, in which professional capacity I first made Mr Yeoman's acquaintance.

Partly encouraged by him, I became interested in the waterways which powered our mills and consider myself fortunate to have been chosen by Mr Smeaton as his assistant during the construction of the Calder and Hebble Navigation in Yorkshire. This fine waterway threads its way through the Pennines from Sowerby Bridge in the west to Wakefield in the east, a distance of 21.5 miles with 28 locks. We had our share of problems to overcome, you may be sure, but traffic using the waterway is rising quickly, nd there can be no doubt that the Calber and Hebble is giving a great boost to commerce and industry in that part of Great Britain. I am grateful to Mr Smeaton for the opportunity to contribute to those worls.

With luck, my next major project will be in the South. Some time ago I received instructions from the Thames Commissioners to survey the river between Maidenhead and Reading, and make proposals to improve its navigability. I have presented my results to Parliament. As many of you will know, the viability of a river improvement scheme has been hotly contested by those who argue that only canals can provide a modern solution capable of handling the traffic anticipated. Nevertheless, I believe that my proposal

for an 8-lock scheme was well received and am hopeful it will be chosen. For I was able to show that my scheme can easily handle the volume of traffic anticipated, costs less than the canal schemes and its environmental impact on the neighbouring wetlands, home to many endangered species, will be far less. It's a sobering thought that my scheme could still be in use 250 years from now. As you may imagine, I am awaiting the decision with anticipation.

Tony Roche introduces John Golborne

In this contribution another member is introducing John Golborne at the second meeting of the society

Good Evening Gentlemen,

On this 29th day of March it is my pleasure to introduce John Golborne who is engaged in civil engineering with much experience in the construction of canals and works to improve the navigation of rivers

He learnt of the formation meeting of the Smeatonian Society of Civil Engineers, held two weeks ago on 15th March and it is of great interest to him.

He was born in Chester in 1724 and his father William Golborne was a schoolmaster, who encouraged him and his elder brother James to take great interest in scientific and engineering studies.

He began working for his brother in 1735 on works on the River Dee. He became the Engineer to the River Dee Company in 1754 and during this period provided consultancy services for the River Weaver Navigation. He still holds this position and has sought to continue the works of river training and land reclamation originally instituted by Mr Nathaniel Kinderley some 40 years ago

Three years ago Mr James Brindley recommended him to the proprietors of the Forth and Clyde Canal to consider the navigation of the rivers Caron and Clyde upon which he has now reported. He is now tasked to prepare a scheme for deepening of the river for a length of 12 miles below the city.

In a more recent assignment he has been engaged in problems related to the construction of a dam and lock at Marlin Ford, Renfrew, on the River Clyde. This is part of an initiative to create an improved water way between Glasgow and the sea to support the developing tobacco trade. The original design was made by Mr John Smeaton and at the behest of Mr Golborne, Mr James Watt was commissioned to validate the design criteria. The construction of the dam and lock is now underway, with his nephew James as the Resident Engineer.

In the past two years he has been working on two major assignments, firstly with Mr James Brindley and Mr Thomas Yeoman advising on improvements to the outfall of the River Nene and secondly on the drainage of the North Level of the Fens and also the Outfall of the Wisbeach River

Gentlemen, I trust you will agree that Mr Golborne will be a worthy member of our Society

Andrew Wolstenholme introduces Robert Whitworth

Thank you, John, and to our esteemed landlord.
I am indeed honoured to be asked here tonight, and to a place (The King's Head) so renowned as this, though the journey cross country has been lengthy. Perhaps sometime in the future we should devise ways of meeting that do not actually require you to travel.
I feel it is before my time to be invited as a Smeatonian in this, my 37th year - there is much still to achieve, and my career has only just started.
But my love of engineering and in particular the art of designing canals and waterways to serve industry and our communities across this Great Nation for centuries will, I hope, help to tell this society's story in the future.
Perhaps in the years to come the Smeatonians will attract more than a handful of members, and one day might even receive royal patronage.
The image behind helps to define my journey so far – it shows the intended navigable canal between Coventry and Oxford. Its main purpose is to bring coal from the Coventry mines to Oxford and the River Thames. As the 'father of British inland navigation – The Duke of Bridgewater', has said 'every canal must have coals at the heal of it'.
But I must remind you that as an assistant to James Brindley I owe much of what I know today to this great engineer and to his willingness to guide me. As Brindley's chief surveyor and draftsman, I know how important the drawn specification is to be able to accurately predict the effort needed to complete these great engineering endeavours and to plan for their complexities. In my earlier years I have also been fortunate to learn from Smeaton's methods …though I have not worked with him directly. It is so good to meet him here tonight.

My most recent work has taken me to Ireland to assess proposals for the Lagan Canal and to County Durham for a canal near Stockton-on-Tees. It has also included reviews of plans for a canal between Leeds and Liverpool and of improvements to the River Thames. I am particularly proud of an innovative solution to bypass the river channel at Bray - which won approval, though my ideas to do the same at Monkey Island, as many of you know - did not.
It is customary to tell you about myself rather than just what I do – well, my father was a Combsmith and bought me up with my six brothers and sisters at our home in Sowerby, in the West Riding of Yorkshire where I was born in in 1734.
I have a wife called Sarah who I married just 6 years ago and we now have two sons.
Perhaps one day they too will be engineers who design and build canals and waterways to leave a legacy of this great age of engineering.
Perhaps one day this society will raise their glasses each time they meet and toast…. the canals and waterways.
I would like to hand over to our final new member, and whilst we share our birth year, is actually younger than I am.
Your Royal Highness, Ladies and Gentlemen - Hugh Henshaw

Andrew Wolstenholme sported a fine black stovepipe hat for his presentation.

David Johnson introduces Hugh Henshall

Backdrop - Drakeholes Tunnel – Chesterfield Canal (required boats to be legged through)

Good evening everyone. I'd like to thank you for inviting me to this august gathering and to introduce myself.
My name is Hugh Henshall, and at 37 years old, I seem to be the youngest member of this group, just beating my good friend, Mr Whitworth to this place – and may I say what an

honour it is to be asked to join you. My profession is that of a navigation engineer – although from listening to this group, the term 'canal engineer' seems to be gaining popularity. I am a Staffordshire man, originating from Newchapel in the parish of Wolstanton and started this line of work following in my father's footsteps as a land surveyor. After an education at Newchapel Grammar School, I started surveying in the counties of Staffordshire, Cheshire and Gloucestershire and I also worked on the survey of the Staffordshire and Worcestershire navigation. When Mr Congreave proposed linking the Trent and Mersey rivers by a navigable waterway, I worked for Mr Smeaton – who I am pleased to see here today - and Mr Brindley – who will be known to many of you - on surveying the route and taking responsibility for producing the parliamentary map. I have looked up to Mr Brindley - who happens to be married to my younger sister - for guidance, which he has most graciously given.
5 years ago, I was appointed as clerk of works on this most grand project linking the Trent and Mersey – which some say is considered to be the premier engineering project in the country. I have to say, without wishing to boast, that my salary of £150 per year for me and my assistant is more generous than I am used to, but I believe it reflects the level of responsibility expected of my role. I now work directly for Mr. Brindley who is proving to be a very demanding employer and a man of very firm views - although I am most worried that he may not be giving full regard to his health due to his constant endeavour. My work has largely been on the northern section of the waterway, which includes the Saltersford and Barnton tunnels. The Trent and Mersey navigation is well advanced these days, and I'm proud to say that it looks as though we might complete it ahead of schedule and below budget. As you are aware, our profession does have a reputation for taking longer to construct such undertakings and at a higher cost than was originally intended and both Mr. Brindley and I are intent on demonstrating that this need not always be the case. Part of my responsibility is in the training of aspiring new engineers, a number of whom I am guiding in the belief that unless we do so, there may well be a shortage of such men to undertake the scale of the works that may well develop over time.
I'm also supporting Mr Brindley on a new project known as the Chesterfield navigation which is also proceeding at pace. In particular, the Norwood tunnel, when completed, will be the longest in the kingdom at 2,844 yards long. I do have a number of other interests, one of which is in the potteries of Staffordshire – where I am particularly interested in Mr Wedgwood's and Mr Brindley's plan to create what they are referring to as a 'great cross' of navigable waterways to span the country. It really does look as if waterways will become the future transport of the country, as there is no other means by which significant quantities of merchandise can be carried efficiently and with relative speed.
Gentlemen, thank you for inviting me into this esteemed group, and I look forward to both learning from you and contributing to the collective knowledge of what Mr Smeaton refers to as Civil Engineering.
So I'd like to hand back to Mr Pierce, our host.

Mr Pierce continues:

"What outstanding Engineers!
Now Mr Yeoman, as we agreed, I should like to introduce one of our regulars at the tavern who is one of a growing number of well-lubricated newspaper hacks who do their business here.
She is the Engineering correspondent for the new *Morning Chronicle and London Advertiser*.

She has been following the latest developments in Engineering and can suggest some other engineers who you might consider for membership of your Society. Here she is, Miss Elton."

"Good evening gentlemen. I have been listening to you all with great interest and I applaud your aspiration to share your experiences for the benefit of everyone.
I have, however, overheard discussions about those people you are proposing to elect in the near future (and perhaps you should not be having such conversations in taverns if you wish to observe Chatham House rules). I consider that your nominees largely reflect your existing interests in canal and river engineering, bridge building, millwrighting and fen drainage but for the good of your Society you should perhaps be looking at other disciplines to enlarge your knowledge.
For this reason, I would most sincerely suggest that you invite Mr. John Metcalf to join your Society. Mr. Metcalf lost his sight aged 6 and now goes under the soubriquet of 'Blind Jack of Knaresborough'. He has triumphantly overcome his disability and has already built 115 miles of roads in Lancashire and Yorkshire. I believe that he has it in mind to build 200 miles before he dies. He learned about the appalling state of the roads by walking over them and on one occasion, he told a friend that it would be quicker to walk 200 miles from London to Harrogate than to go by coach and it was! He got there first, despite getting lost on the way. He surveys and lays out his roads, hires the labour force, and builds bridges where necessary. Furthermore, he has developed a successful method of crossing boggy land by using bundles of heather, a sort of floating foundation on which the roadstone is laid. Surely this method will be of use to engineers in the future. He has certainly acquired an expertise that seems to be lacking amongst your members. I realise that road building is a very minor branch of your profession but perhaps this will change.
Might I also draw to your attention to Mr. Henry Berry. Mr. Berry built the Sankey Canal which, as I am sure you all know, was the first canal to be built in this country, pre-dating Mr. Brindley's Bridgewater Canal. He was also concerned with improving the Weaver navigation, though here, alas, he had a foundation failure with one of his locks. This is something you will not hold against him, as you will all know how ground conditions so frequently cause problems in construction. Mr. Berry overcame this setback and went to Liverpool where he completed the Salthouse Dock before building two new graving docks there. His George's Dock in that same city has just opened and he is planning to construct two more, even larger, docks there. His achievements will, I am convinced, ensure Liverpool's success as a major oceanic port. Mr. Grundy will no doubt support a proposal to elect Mr. Berry, since he has been looking into a proposal to build a dock in Hull and will, I believe, be consulting Mr. Berry, who has such unusual experience in this branch of civil engineering.

I now feel second sight coming on, a condition I am prone to when a surfeit of liquor quickens into life my Viking blood. I foresee that your Society will become an outstanding success and every great engineer will belong to it, every great

engineer, that is, save one. That engineer will build roads and docks. He will build ship canals in Britain and abroad and he will design magnificent bridges in stone and iron. He will add enormously to the prestige of your profession and will be buried in Westminster Abbey. His name is Thomas Telford and he will never become a Smeatonian. However, by exercising my supernatural talents on your behalf, I am giving you an opportunity to change the future.
I am now going to hand you back to Mr. Yeoman."

Julia Elton hands over to Thomas Yeoman who makes closing remarks and proposes the 1771 Toast:

Gentlemen,
We have done good work this evening.
We have agreed that the civil engineers of this Kingdom do form themselves into a Society and you have been so generous as to elect me the first President of the Society.
This will not be a learned society but more of a dining club where we, who have so much in common but find little time to spend together, can meet in a friendly atmosphere and get to know each other better. I hope that conversation, argument and a social communication of ideas and knowledge in our particular walks will be, at the same time, the amusement and the business of our meetings.
I thank you all for your participation and look forward to our next meeting a fortnight hence.
No doubt we will develop a set of toasts to conclude our meetings, but for now, let us raise a glass to "The King and Constitution".

CP continued:

"So now our Time Machine is returning us to 2021

Many thanks to all my collaborators who have taken part this evening and to Mike Chrimes who provided initial biographies, and to Rod Muttram for all his work in preparation and this evening.
You have astonished me with your lively highlighting of the lives of the first of the 'Late Worthy Brothers' recalled in our toasts to this day.
It seems to me that, together, we have re-created Act 1, Scene 1 of the History of The First Engineering Society.

Now it's time for others' contributions.
Would you all please switch to Gallery view, with your cameras on, and 'raise a hand' if you would like to make a comment, ask a question or make a contribution.
Please keep your microphones muted until called to speak.
Rod will be monitoring the raised hands and will call you in turn."

A lively discussion ensued – and key points are gathered in the report of the meeting that was posted on the Society's website and is copied into the final pages of this compilation.

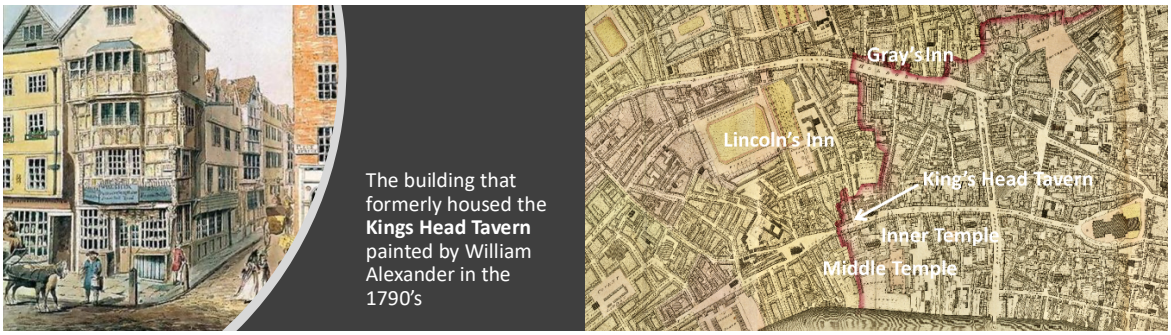
At the end of the open discussion period (at 19:15)
CP reappeared as Mr Pierce
"TIME Gentlemen Please.
I see that you have had a very good meeting and I wish your new Society every success and a very long life."

CP as Narrator handed back to the President who conducted the 2021 toasts.

Report of the 250th Anniversary Event as posted on the Society's website:

Christopher Price OBE BSc FREng FIMechE
15 March 2021, Virtual Performance and Discussion
**
250th Anniversary Event
15 March 2021, Virtual Performance and Discussion

The evening of the 15th March 2021 marked the actual moment when the Society became 250 years old. At the instigation of past Treasurer, Chris Price, we held a unique and very enjoyable and informative celebration – at the 'virtual' Kings Head Tavern in Holborn.



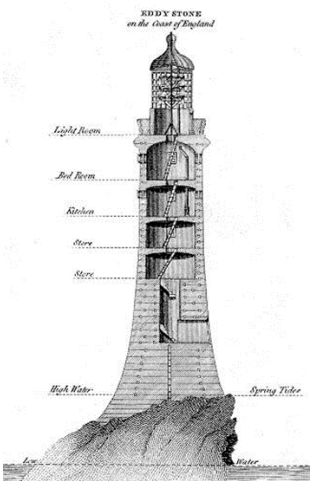
The Kings Head Tavern in the late 1700's

Chris Price's original idea had been a small gathering at a hostelry close to the site of the original King's Head where the Society's first meeting was held; the COVID restrictions prevented that but our increasing experience with holding virtual events allowed an on-line gathering of 60 members including our 2021 President HRH The Princess Royal.
After an introduction by Her Royal Highness Chris activated his virtual 'time-machine' to take us back to that evening in 1771 when John Smeaton and six of his associates met and agreed to form *The Society of Civil Engineers*. But the time machine's initial reaction was 'location not found – web data ambiguous' and Chris explained the researches he had needed to do to find the location of the correct King's Head. It transpires that it was at the corner of Fleet Street and Chancery Lane, well placed between the Inns of Court where the Engineers were working with their lawyers on agreements and parliamentary bills to enable their infrastructure projects to go forward. The King's Head was demolished in 1799 and the site now holds a Jewellery shop most notable for an audacious robbery when Fleet Street was full of half marathon runners in 2019. Having re-set the time machine, we were taken back to the King's Head where Chris morphed into **Mr Pierce, the Landlord**, welcoming the Engineers and telling us about his establishment.
"The tavern occupies the first and second floors, above two shops one of which is the bookshop where the first edition of Isaac Walton's famous book The Compleat Angler was printed and sold in 1653. The history of the King's Head Tavern goes back 300 years to 1472 in the second reign of King Edward IV.
"In 1666, fortunately, the Great Fire of London stopped its westward progress just short of the tavern. Which was also the venue for meetings of the notorious anti-Papist "Green Ribbon Club"
"The noted 1660s diarist Samuel Pepys was a regular visitor and as President of the Royal Society he met here with other Fellows, including occasions when they drank, dined and discussed lectures that they had attended at Gresham College.

“So, Mr Yeoman and Mr Smeaton, as Fellows of that same Royal Society, as well as having regular business in this part of London, you have chosen the most appropriate place for your Group of the country’s leading Engineers to meet and to dine.”
Then after regaling the gathering with the delights of the Tavern’s menu, using fresh produce from Covent Garden, Smithfield and Billingsgate, Mr Pierce handed over to Thomas Yeoman who was elected that evening as the Society’s first President (The Society did not adopt the name Smeatonian Society until the mid-1800’s).
Thomas Yeoman (played by James Whiteaway) introduced himself:
“Born in Somerset in 1709, and 62 years old, I will in a moment summarise my skills in engineering, but firstly let me set our meeting into some perspective.
We have today, Friday 15th March 1771, gathered in the King’s Head Tavern in Holborn with the objective of forming the Society of Civil Engineers. I am honoured that you are considering me for election as the first President of the Society. The objective of the Society is to have good conversations concerning our skills and for pleasant social interaction, and not so much to be a learned society.
Now is an excellent time to be an engineer. London was of course severely damaged by the Great Fire more than 100 years ago now, and engineers played a significant role in rebuilding it.
My personal skills were developed firstly as a wheelwright. I was then recruited by Edward Cave to operate a water-powered cotton roller-spinning mill at Northampton in 1741. I established myself then as a millwright and went on to construct ventilators. These machines were important in improving the conditions in coal mines which often had a suffocating atmosphere due to the presence of choking coal dust. Ventilators were also used on ships of the fleet.
More recently, as my business flourished, I moved to Gold Street where I built and sold scientific instruments, and then to Bridge Street in Northampton.
In 1744 I surveyed the River Nene which flows from near Northampton into the Wash. I subsequently worked as a surveyor and engineer on many canal and river navigations including the River Stort, Lea, Chelmer, Medway and Thames. I also worked as an assistant to John Smeaton, with a major achievement being the Limehouse Cut which allowed shipping to avoid the sinuous lower reaches of the River Lea. I was elected a Fellow of the Royal Society in 1764.
Given my close connections with John Smeaton, it is therefore very appropriate that I now hand over to him so that he can introduce himself to your good company.”
John Smeaton (played by Paul Jowitt) was next to introduce himself:
“Good evening, Gentlemen. And some Ladies too, I see! My name is Smeaton, John Smeaton
I was born in 1724, at Althorpe Lodge, near Whitkirk in the West Riding of Yorkshire.
As a young man I liked “engineery” things but Father wanted me to follow him into the Law, so in 1742 he sent me to Grays Inn.
I returned to Althorpe in 1744, and convinced Father to let me pursue an apprenticeship with Mr Hindley at his workshop in Petergate. In 1748, I set out for London to set up as an instrument maker, with premises in Great Turnstile off Holborn, and later in Furnival Inn Court. I was able to attend meetings of the Royal Society in the Strand and present a number of papers. I was elected as a Fellow in 1753.

After an extended study, including five weeks in the low countries, in 1759 I read a Paper to the Royal Society entitled “an experimental enquiry concerning the natural powers of water and wind to turn mills and other machines, depending on a circular motion.”
It was well received, and subsequently, I was awarded the Copley Medal

In 1756, the President of the Royal Society recommended me to build a new lighthouse on the Eddystone Rock. My design had dovetailed granite blocks and marble dowels, assembled to resemble the trunk of an oak tree. I also used hydraulic lime, which would set under water. The light was first lit in October 1759 and has proven a great and celebrated success.



Cross Section of 'Smeaton's Tower'.

In 1756, I was invited to survey a canal, to extend navigation along the River Calder and Hebble Brook, from Fall Ings Cut in Wakefield, to Halifax. Construction started in 1759. By 1764 the navigation had reached Brighouse. Our eminent friend, Joseph Nickalls, was my resident engineer in this endeavour.

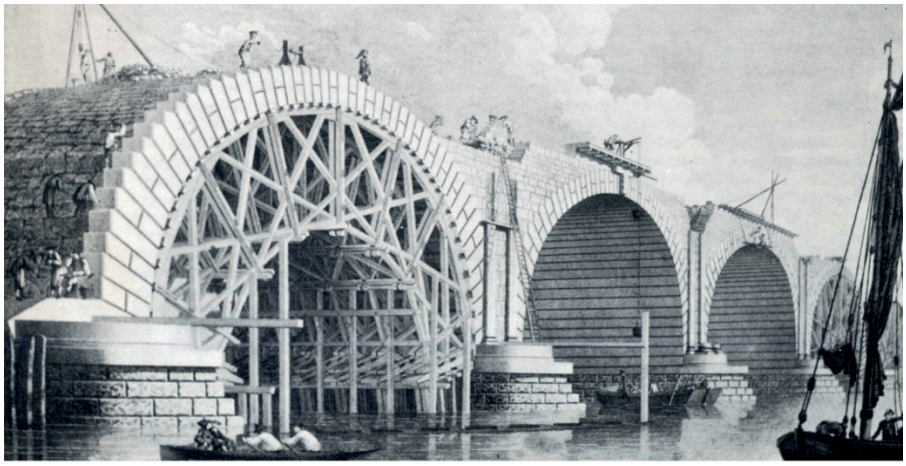
By profession, someone once said, I was a Civil Engineer……..In fact, I think it was me…

[From this point the contributions are reported in the third party for brevity]

Robert Mylne (played by Hugh Ferguson):

Mylne came from a long line of Scottish master masons and architects.

After his apprenticeship, he spent four years travelling and studying architecture in Europe, culminating in the Silver Medal for architecture in the prestigious Concorso Clementino in Rome. On returning to London in July 1759 his design for Blackfriars Bridge was chosen from some 50 entries – including one from his friend Smeaton.



Blackfriars Bridge under construction

His design also included innovative engineering including the first use of elliptical arches in Britain. But the greatest challenge came as Surveyor for the construction - supervising everything from purchase of properties and laying out approach roads to managing contractors for the foundations and masonry in the treacherous tidal waters of the Thames. The bridge opened in 1769

Blackfriars Bridge provided a platform for two parallel careers – as an engineer and as an architect (including as surveyor for both St Pauls and Canterbury Cathedrals).

By 1771 he was developing a third career, as a hydraulic engineer. Four years earlier the New River Company had appointed him as joint surveyor at a salary of £200 per year. A salaried position which allowed him to pursue private work as well was a great comfort. Mylne knew he was considered arrogant and high-handed. One of his workmen referred to him as 'a rare jintleman, but as hot as pepper and as proud as Lucifer'. He assured the other founding members that he would be a genial companion. His son and grandson were both leading Smeatonians.

John Grundy (played by Peter Hansford)

John Grundy hailed from Lincolnshire and was just over 50 in 1771. His father, also John Grundy, was quite a renowned mathematician and land surveyor in his day, and one of the first people in the UK to practice what we would now call civil engineering. Having been trained and mentored by his late father he was proud to be known as "John Grundy of Spalding, Engineer".

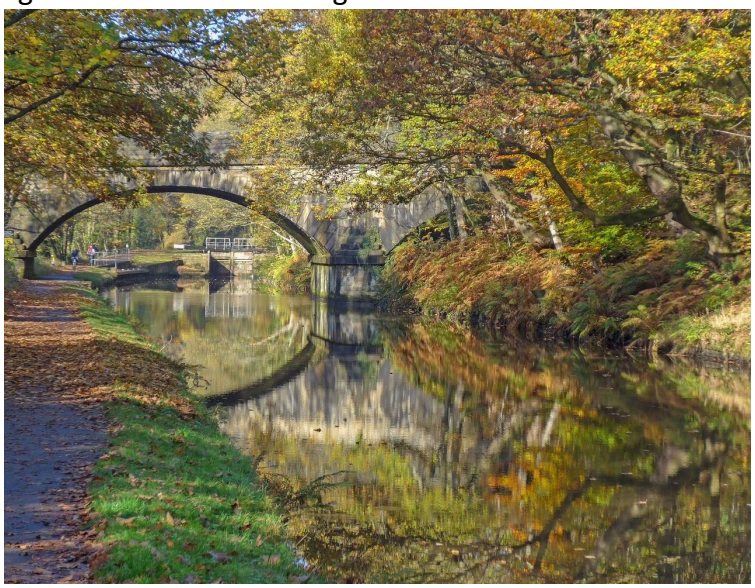
Grundy's career had been entirely focused on surveying, protecting and improving the great rivers and drainage courses of East Anglia, as well as repairing sea defences in Happisburgh (pronounced Haze-Bruh) on the North Norfolk coast. He worked extensively with the rivers Trent, Humber, Witham, and Hull and prepared numerous authoritative reports, notably for the Earl of Lincoln and the Duke of Ancaster.

He collaborated with Mr Smeaton to improve navigation on the River Witham between Boston and Lincoln and for drainage of the adjacent Fen. A report that he prepared jointly with Mr Smeaton and Mr Langley Edwards resulted in a Bill being laid before Parliament some nine years earlier, seeking authorisation to shorten the river course between Boston and Chapel by over two and half miles. This scheme also included the mighty Grand Sluice and navigation lock at Boston, which he was proud to claim as being the largest structure of its kind in this country completed just five years before the gathering.

In the last few years before 1771 he had been directing the design and construction of new main drains and raising banks on the River Hull, again in collaboration with Mr Smeaton, and supervising construction of the Driffield Navigation in the East Riding of Yorkshire. In 1771 he turned his attention to drainage in the Wisbech area and to dock facilities in the port of Hull which he foresaw becoming a major port in future years.

Joseph Nickalls (played by Michael Purshouse):

Nickalls was a Londoner who originally trained as a Millwright, in which capacity he first met Thomas Yeoman. Partly encouraged by him he became interested in waterways and was chosen by Smeaton as his assistant during the construction of the Calder and Hebble Navigation in Yorkshire – a fine waterway through the Pennines spanning the $21^{1}/_{2}$ miles from Sowerby Bridge to Wakefield including 28 locks.



Elland viaduct on the Calder and Hebble Navigation

In 1771 he was hoping that his next job would be in the south. He had received instructions from the Thames Commissioners to survey the river between Maidenhead and Reading to improve its navigability and had just presented his results to Parliament. Perceived wisdom at the time was that only a full canal scheme would be able to handle the traffic anticipated. But Nickalls' scheme to improve the river with eight locks was well received and he predicted it would easily handle the traffic. In his words "It is a sobering thought that my scheme could still be in use 250 years from now and I await a decision with anticipation"

John Golborne (introduced by Tony Roche)

John Golborne joined the Society at its second meeting on the 28th March. A canal and river engineer he had heard of the formation of the Society on the 15th March and was greatly interested in joining.
Born in Chester in 1724 his father had been a schoolmaster and had encouraged him and his brother to take an interest in science and engineering studies. He began working for his brother in 1735 on the River Dee. He became the Engineer to the River Dee Company in 1754 and during this period provided consultancy services for the River Weaver Navigation. In 1771 he still held this position and sought to continue the works of river training and land reclamation originally instituted by Mr Nathaniel Kinderley some 40 years before.
Three years earlier, James Brindley had recommended him to the proprietors of the Forth and Clyde Canal to consider the navigation of the rivers Caron and Clyde upon which he had reported. He was now tasked to prepare a scheme for deepening of the river for a length of 12 miles below the city.
More recently he had been engaged in problems related to the construction of a dam and lock at Marlin Ford, Renfrew, on the River Clyde. This was part of an initiative to create an improved water way between Glasgow and the sea to support the developing tobacco trade. The original design was made by Mr John Smeaton and at the behest of Mr Golborne, Mr James Watt was commissioned to validate the design criteria. The construction of the dam and lock was now underway, with his nephew James as the Resident Engineer.
In the past two years he had been working on two major assignments, firstly with James Brindley and Thomas Yeoman advising on improvements to the outfall of the River Nene and secondly on the drainage of the North Level of the Fens and the Outfall of the Wisbeach River.

Robert Whitworth (played by Andrew Wolstenholme)

Whitworth was quite young in 1771, only 37 with much still to achieve. His father had been a Combsmith and bought him up with six brothers and sisters at their home in Sowerby, in the West Riding of Yorkshire where he was born in in 1734. He loved engineering and in particular the art of designing canals and waterways to serve industry and communities.
He had designed a navigable canal between Coventry and Oxford. Its main purpose to bring coal from the Coventry mines to Oxford and the River Thames. As the 'father of British inland navigation – The Duke of Bridgewater', has said 'every canal must have coals at the heel of it'.
As an assistant to James Brindley he said that he owed much of what he knew today to that great engineer and to his willingness to guide him. As Brindley's chief surveyor and draftsman, he knew how important the drawn specification was to be able to accurately predict the effort needed to complete these great engineering endeavours and to plan for their complexities. In his earlier years he had also learned from Smeaton's methods …though he had not worked with him directly. So was pleased to meet him that night.
His recent work had taken him to Ireland to assess proposals for the Lagan Canal and to County Durham for a canal near Stockton-on-Tees. He also conducted reviews of plans for a canal between Leeds and Liverpool and of improvements to the River Thames. He was particularly proud of an innovative solution to bypass the river channel at Bray.

Hugh Henshall (played by David Johnson):

Henshall, was also 37 years old and the youngest member of the group being slightly younger than Whitworth. He was a navigation engineer, although the term 'canal engineer' was gaining popularity.

He came from Newchapel in Staffordshire and started in his father's footsteps as a land surveyor. After an education at Newchapel Grammar School, he started surveying in the counties of Staffordshire, Cheshire and Gloucestershire and also worked on the survey of the Staffordshire and Worcestershire navigation. When Mr Congreave proposed linking the Trent and Mersey rivers by a navigable waterway, he worked for Smeaton and Brindley on surveying the route and taking responsibility for producing the parliamentary map. Brindley who was married to his younger sister was his role model and mentor.
5 years earlier, he had been appointed as clerk of works on linking the Trent and Mersey working directly for Brindley. His work was largely on the northern section of the waterway, including the Saltersford and Barnton tunnels. The Trent and Mersey navigation was well advanced by 1771 and predicted to complete ahead of schedule and below budget, not common even then.
He was engaged in training aspiring new engineers and was supporting Brindley on a new project known as the Chesterfield navigation which was also proceeding at pace. In particular, the Norwood tunnel, when completed, would be the longest in the kingdom at 2,844 yards long.
As he said "It really does look as if waterways will become the future transport of the country, as there is no other means by which significant quantities of merchandise can be carried efficiently and with relative speed."
Mr Henshall then handed back to the Landlord who introduced a **contemporary journalist** from 1771 who had been reporting on engineering matters, played by Julia Elton.
The journalist: "Good evening gentlemen. I have been listening to you all with great interest and I applaud your aspiration to share your experiences for the benefit of everyone.
I have, however, overheard discussions about those people you are proposing to elect in the near future (and perhaps you should not be having such conversations in taverns if you wish to observe Chatham House rules). I consider that your nominees largely reflect your existing interests in canal and river engineering, bridge building, millwrighting and fen drainage but for the good of your Society you should perhaps be looking at other disciplines to enlarge your knowledge.
For this reason, I would most sincerely suggest that you invite Mr. John Metcalf to join your Society. Mr. Metcalf lost his sight aged 6 and now goes under the soubriquet of 'Blind Jack of Knaresborough'. He has triumphantly overcome his disability and has already built 115 miles of roads in Lancashire and Yorkshire. I believe that he has it in mind to build 200 miles before he dies. He has developed a successful method of crossing boggy land by using bundles of heather, a sort of floating foundation on which the roadstone is laid. Surely this method will be of use to engineers in the future? He has certainly acquired an expertise that seems to be lacking amongst your members. I realise that road building is a very minor branch of your profession but perhaps this will change.
Might I also draw to your attention to Mr. Henry Berry. Mr. Berry built the Sankey Canal which, as I am sure you all know, was the first canal to be built in this country, pre-dating Mr. Brindley's Bridgewater Canal. He was also concerned with improving the Weaver navigation, though here, alas, he had a foundation failure with one of his locks. This is something you will not hold against him, as you will all know how ground conditions so frequently cause problems in construction! Mr. Berry overcame this setback and went to Liverpool where he completed the Salthouse Dock before building two new graving docks there. His George's Dock in that same city has just opened and he is planning to construct

two more, even larger, docks there. His achievements will, I am convinced, ensure Liverpool's success as a major oceanic port.
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The Journalist then handed back to **Mr Yeoman** the new President of the Society who said:
"Gentlemen,
We have done good work this evening.
We have agreed that the civil engineers of this Kingdom do form themselves into a Society and you have been so generous as to elect me the first President of the Society.
This will not be a learned society but more of a dining club where we, who have so much in common but find little time to spend together, can meet in a friendly atmosphere and get to know each other better. I hope that conversation, argument and a social communication of ideas and knowledge in our particular walks will be, at the same time, the amusement and the business of our meetings.
I thank you all for your participation and look forward to our next meeting a fortnight hence.
No doubt we will develop a set of toasts to conclude our meetings, but for now, let us raise a glass to the King and Constitution."
After that Toast the **Narrator/Landlord** returned us all to 2021 where there was a lively and thought-provoking debate about the priorities for the Society going forward (see *Discussion* below)
The Landlord then briefly returned to 1771 where he called 'Time' on the discussion.
Back in 2021, the President, Her Royal Highness The Princess Royal summarised the proceedings of the evening and thanked and congratulated Chris Price for the idea and all those who had contributed to making this such an enjoyable and informative evening. She then led us through our traditional toasts before closing the formal proceedings.


HRH The Princess Royal summarising the discussion

**

Discussion

Proceedings at the King Head Tavern in March 1771, as recreated by Chris Price and his team of actors, gave rise to a lively discussion which was impromptu and somewhat unexpected.

After a brief discussion about why Thomas Telford had never been a Smeatonian (the consensus being that he fell out with Rennie and his family), Deputy-President Sir John Armitt raised the point that if the founders of our Society thought that their canals would be the definitive form of transport and had no inkling in 1771 of the arrival of railways fifty year later, what issues today may cause a similar transformation? What will engineers be doing fifty years from now that we cannot currently imagine and how might we contribute more to developing these new areas without losing the traditions and history of the Society? This led to several themes emerging:

- Sustainability and Climate issues: The target has been set to limit the global temperature rise to 1.5^{o}C but current projections look more like 3^{o}C. If that is the case many engineers will be involved in mitigating actions; not just flood defences but geo-technical issues and carbon capture. The point was made that there will be an increased need for what is called 'Garden Engineering' – hydraulics, dams, water wheels and turbines and windmills. A very big issue is finding replacement materials for concrete which is a significant contributor to CO^2 emissions.
- Energy: What if nuclear fusion finally comes good and we have limitless cheap power and water? Equality of access will be essential. With the shift to renewables and smaller scale generation distributed systems will become more important, not just for generation but likely for storage too. Electrification of the vehicle fleet offers the potential for vehicles not-in-use to feed energy back into the grid for load/generation balancing. The computing power to control that effectively is available now. Hydrogen as a fuel potentially offers a bridge between 'green' energy and transport modes like aviation. Much of the technology is available but the right strategies and investment are essential.
- The Oceans: two thirds of our planet is under water; would we not be better understanding and sustainably developing the oceans than trying to build on the Moon and/or Mars?
- Data analytics/communication: The success of communication tools like 'Zoom' through the pandemic has been amazing: many people would not have heard of it a year ago, now it is a 'household name'. It is likely that working patterns and (at least to some degree) transport needs will be changed for ever (perhaps favouring different solutions like Hyperloop) and in some respects team work has been enhanced. The digital infrastructure has performed remarkably well but needs further investment. The point was made that 'not travelling' has downsides too, and all of these digital technologies need solutions to avoid abuse or mitigate consequences, be that on-line bullying, fake news and misinformation or 'targeted influencing' that crosses the line into manipulation. Engineers need to develop techniques to avoid harm from these technologies as we have in other areas. Communication technology continues to evolve with very high data-rate fibre optics increasingly being used over very short distances, saving a great deal of power for big data centres.
- Artificial intelligence: Advances in AI, machine learning and quantum computing will likely mean that all the 'heavy lifting' in terms of design and validation is done by the machines. What will the role of the human engineer be then? Option selection and the stakeholder interface, it was suggested. To what degree will autonomous vehicles be accepted and adopted for road transport and what will the impact be on infrastructure needs?

- Bio engineering: The technology exists now to generate artificial organs and the pandemic has rapidly advanced vaccine development. Both in this area and AI (which is also being implemented for medical diagnostics) engineers will increasingly be involved in ethical issues.
- Core competencies: The point was well made that there is still much improvement possible in existing techniques. Tunnels and bridges still cost too much and take too long to build.
- Diversity: It took the Society 200 years or so to admit its first woman. Many of us have worked internationally and strongly believe in the power of diversity in every sense. How do we better help make the profession and the Society more diverse?
- Systems engineering: The society needs to embrace all engineering disciplines in the spirit of the original 'Civil' engineer meaning of anything that was not 'military' and even that distinction is now much more 'blurred'. The tragic events at Grenfell Tower give rise to many lessons but one of them is the adverse impact of 'silo thinking' with different disciplines acting in isolation. We need safe 'integrated' systems and that means all of the involved disciplines working together.

An extremely interesting and thought-provoking set of points that will give the Committee much to think about and provide subjects for future discussion evenings.

[*The account above has been condensed but full texts and images used with the presentations are retained in the Archives of the Society.*]

Appendix: Circulated to attendees by CP before the meeting

I promised you a brief guide to the drinks that would have been offered at the King's Head Tavern in 1771, so that when we, today's Smeatonians, gather there virtually on 15th March 2021 we can enjoy some appropriate refreshment and be well prepared for the toasts.
Even without covering all the drinks that were on offer at the time, I have found more interesting facts than I thought I would, so the note is longer, and you may prefer to just dip into the detail for the tipples you fancy. If you are inclined to skip through, please have a look at Punch for a snippet of Society history, and at the end for the reason for my choice.

Drinks that were popular around 1771:

Port
The Duro Valley region of Portugal was officially demarcated as the production region for Port in 1756. Like Madeira it was fortified to prevent spoiling during transportation by sea.
William Pitt the Younger, prime minister from 1783 to 1801, would drink a bottle of port before giving a speech before the House of Commons. Samuel Johnson (renowned author poet and playwright described in the *Oxford Dictionary of National Biography* as "arguably the most distinguished man of letters in English history"), was an enormous Port enthusiast too: "I have drunk three bottles of Port without being the worse for it. University College has witnessed this." These would have been the pint bottles in use at the time.
Wine imports to Britain were around 10 million gallons in 1750 and most of this was Port.

Brandy
By one eighteenth century count there were 8,659 Brandy shops in London (one for every 115 people if we take the population of one million in 1800). Given that, it's safe to assume that there were plenty of cheaper un-aged brandies around. It was already two centuries since wine makers started distilling to preserve their product, to make it more easily transportable and to lessen taxes that were assessed by volume (the Hydrometer wasn't invented until 1730, in London). The intention was that water was added to revert to the alcohol level of wine immediately before consumption, or so they said!

Red wine, "Claret" or "Bordeaux"
The term Claret was reserved for the richer and more expensive wines from Bordeaux. Both were popular but frequent wars with France made supplies unpredictable, making the more reliable Port even more popular.
Spanish wine was imported into England at the time but it was too early for Australian wine (the first vines weren't taken to Australia until 1778) or Californian wine (first made at the Spanish missions in San Diego in 1769, but not developed significantly until a century later).

Madeira

The sweeter and deeper flavours of this fortified wine are developed by heating and cooling of the wine, mimicking what happened to the barrels of wine from the island of the same name on ships passing through the tropics while delivering them. The 18th century was the "golden age" for Madeira.

Madeira was not only popular in Great Britain but also in the American colonies, Brazil, Russia, and Northern Africa. It had a key role in the international politics around 1771, when one of the major events on the road to the American Revolution was the British seizure of John Hancock's sloop the Liberty on May 9, 1768 in Boston. The British seized Hancock's boat after he had unloaded a cargo of 25 'pipes' (3,150 gallons) of Madeira, and a dispute arose over import duties. The seizure of the Liberty caused riots to erupt among the people of Boston, as did the Boston Tea Party in 1773 over taxation of tea from China shipped to the colonies by the East India Company, leading to the start of the War of Independence in 1775.

Beers and Ales

Small Beer with around 1% ABV was the standard drink with meals for all ages and was even recommended for weaker children as a safe alternative to water (see below). The alcohol in small beer was usually sufficient to kill deadly microorganisms. Consumption of small beer exceeded that of strong beer – making it the most popular drink by volume. Today's equivalent light beers have alcohol contents between 0.5 and 2.8%.

Strong Beers were consumed in huge quantities. Back in 1725, Londoners drank almost two million barrels of strong beer, that's six per head of population, and at 260 pints per ale barrel. The mind boggles! Types of strong beer included Brown Ale, Old Ale (aged a year and sharp and acetic), Pale Ale or Bitter, Scotch Ale (made with slightly caramelised malt) and Porter. The name of Porter was first recorded in 1721 for well-hopped beers made from brown malt and aged in the brewery and distributed in a condition fit to be drunk immediately, instead of being sent out very young for the publican to age as necessary. Early London Porters were strong beers by modern standards at around 6.6% ABV. Porter beers were also marketed as "extra porter", "double porter" and "stout porter", subsequently shortened to Stout. Any Guinness fans among you will be disappointed. Arthur Guinness started brewing in Dublin in 1759 and 10 years later made his first export shipment of six and a half barrels to England, but these were ordinary strong ales as he didn't start selling Porter until 1778. Other big London brewers of the 1770s, Truman's (established in 1666 and revived recently) and Thrale (now Courage) don't appear to offer authentic Porters today.

Punch

Were Mr Smeaton and his associates meeting on 15th March 1771 sufficiently organised to order a bowl of Punch at their first meeting? I doubt it.

In 1777, when Mr Pierce, the landlord of the King's Head was elected to the Society, instead of paying the customary fee he gave those assembled a 3-shilling bowl of Punch. 3 shillings then would be worth £25 today, alcohol wasn't expensive then, and there were just eight other members present so we can imagine a good bowl of Punch. The word Punch derives from Hindi and comes from the word for 'five': the original number of ingredients. The basics were a spirit (usually Rum or Brandy) to provide the alcoholic content, various fruits and spices and something to bulk it out, perhaps cheap wine or fruit juice or even tea.

When the rich drank Punch a typical recipe included: a glass each of the best Rum and Brandy, the fruits and spices, and two bottles of Champagne.

Drinks that less popular, or weren't available at all:

Water

Supplies of water in London were often dangerously contaminated throughout the eighteenth century. Quite a lot of it was pumped from the Thames and the effects of waste entering upstream of the extraction points weren't understood. Around 1771, increased supplies from countryside springs were commissioned, which is something Robert Mylne knew about.

There were plenty of safe alternatives, all alcoholic to a lesser or greater degree, with Small Beer being very cheap, so water itself was a deeply unpopular drink.

Gin

By the late 1700's, Gin was out of favour. At the beginning of the century the English Parliament had actively promoted Gin production to utilize surplus grain and to raise revenue. Encouraged by public policy, very cheap spirits flooded the market. It was at a time when there was little stigma attached to drunkenness. The growing urban poor in London sought relief from the realities of urban life by drinking the cheap beverage excessively. Thus, the so-called Gin Epidemic developed. In 1685, consumption of Gin in England had been slightly over half a million gallons. By 1733 the London area alone produced eleven million gallons of Gin despite the fact that to control drunkenness, Parliament passed the Gin Control Act of 1729. In 1736, Parliament passed a harsh new Gin Act. It attempted to increase the taxes on Gin so high that it would virtually prohibit its purchase by poor people. The law also prohibited the sale of Gin in quantities of less than two gallons. However, the peak in consumption was reached in 1743, when the nation of 6.5 million people drank over 18 million gallons of Gin. Most of this was consumed by the minority of the national population then living in London and other cities. People in the countryside largely continued drinking beer, ale and cider. After its peak, Gin consumption rapidly declined dropping to just over seven million gallons in 1751. It was under two million by 1758, and generally declined to the end of the century. A number of factors appear to have converged to discourage consumption of Gin. These include the production of higher quality beer of lower price. Rising corn prices and taxes eroded the price advantage of Gin. A temporary ban on distilling was imposed. Stigmatisation of drinking gin developed. Criticism of drunkenness increased. A rising standard of behaviour criticized excess. Piety increased. And industrialization valued sobriety

18th century Gin was not the same as today's refined spirit. In London in the early 18th century, much Gin was distilled legally in people's houses (there were estimated to be 1,500 residential stills in 1726) and was often flavoured with turpentine to generate resinous woody notes in addition to the juniper. The use of pot stills allowed some impurities to be carried over into the spirit, including more methanol than is good for you. The early 1800's saw much innovation in distilling equipment, completed by Irishman Aeneas Coffey who in 1730 patented two-column continuous distillation equipment, versions of which are now ubiquitous across the distilling industries. This enabled the introduction of London Gin whose flavour is introduced exclusively through the re-distillation in column stills of ethanol in the presence of all the natural plant materials used, the resultant distillate of which is at least 70% ABV. London Gin may not contain added sweetening exceeding 0.1 grams of sugars per

litre of the final product, nor colourants, nor any added ingredients other than water. The predominant flavour must be juniper. The term London Gin may be supplemented by the term Dry. Minimum bottled strength is 37.5% ABV.
And as for your tonic… see below.

Carbonated water and soft drinks
1771 was a just over a decade too early for these. The chemist Joseph Priestley FRS was credited with the discovery of oxygen and nine other gasses and who was awarded the Royal Society's Copley Medal in 1772 with the citation "On account of the many curious and useful Experiments contained in his observations". In 1767 he discovered a method for infusing water with carbon dioxide and wrote of the "peculiar satisfaction' he found in drinking it, but it was 1772 before he published his paper "Impregnating Water with Fixed Air" and 1781 before carbonated water began being produced on a large scale. The first commercial Tonic Water was produced in 1858 and it was another 30 years before Coca Cola appeared in Atlanta, Georgia.

Sherry or 'Sack', and Marsala
Sherry was now less popular than Port or Madeira despite its reputation at the end of the 16th century as the world's finest wine.
Marsala, from Sicily was produced in the same way as Sherry was in Spain and was first shipped to England in 1773 where it was a great success and went on to become a popular and less expensive substitute for Sherry and Port.

White wine
White wines were imported primarily from Burgundy and western areas of Germany, and to a lesser extent from Italy, with levels fluctuating depending on political and military conflicts, but they were less popular than red wines.

Champagne
The oldest recorded sparkling wine was produced by Benedictine Monks in 1531 who bottled some of their wine before fermentation was complete, leading to popped corks and exploded bottles and the name *le vin du diable* "the devil's wine". Over a century later the English scientist Christopher Merret documented adding sugar to finished wine to create a second fermentation and presented this in a paper to the Royal Society in 1662 (almost forty years before Dom Perignon claimed to have invented Champagne). Fortunately, English glassmakers' technology had just advanced to the point where the bottles could stand the pressure. French glassmakers soon caught up, but quantities shipped from Champagne remained low compared with other alcoholic beverages of the 18th century. It was noticeably sweeter than today's Champagne.

Cider & Perry
Cider was more popular in the country than in the city, although at the end of the 18th century Worcestershire shipped 1.1 million gallons of cider per year and it was customary to pay part of labourers' wages in cider. Perry, from pears, was widely available too.

Ratafia
This drink was fermented from fruits, making it a sweet wine or liqueur. It was considered a "proper and conservative" beverage due to its being offered at the exclusive Almack's assembly rooms in St James's Street which was established as the first of the 'society' clubs in 1762.

Whisky
Scottish Whisky producers had been through a bad time in the 18th century and Whisky's popularity had not kept pace with other drinks.
In 1707, the Acts of Union had merged England and Scotland, and thereafter taxes on it rose dramatically. After the English Malt Tax of 1725, most of Scotland's distillation was either shut down or forced underground. Scotch Whisky was hidden under altars, in coffins, and in any available space to avoid the governmental excisemen. Scottish distillers, operating out of homemade stills, took to distilling Whisky at night when the darkness hid the smoke from the stills. For this reason, the drink became known as Moonshine. At one point, it was estimated that over half of Scotland's Whisky output was illegal.

Flip
Flip is one of the many now-forgotten drinks enjoyed in 18th century London. It was made by mixing ale with sugar, eggs and spice such as nutmeg or cinnamon and then a liberal portion of rum or whisky. Then the liquid was made to "flip" or froth by immersing a red-hot poker from the fire.

Tea, Coffee and Chocolate
These would not have been offered with meals in the tavern.
At the time, Tea was exclusively from China and Japan, as it was not until 1820 that it was found that it would grow well in Assam. Coffee was very popular although the number of Coffee Houses was declining towards the end of the century as clubs became more popular. Roughly milled Chocolate needed to be boiled up with water and milk, and an egg, before being strained, and often having some alcohol added. Incidentally, it was not until 1847 that Joseph Fry & Co. was the first company to market a chocolate bar.

And what about toasting? I found this:
"Toasting was an omnipresent ritual in Britain in the long eighteenth century. It served to cement collective identities and politico-religious allegiances."

In conclusion, my choice for the toasts at the end of our gathering will be Madeira. Perhaps the tradition of offering it, as well as Port, at our Smeatonian Society Dinners goes right back to its popularity in 1771. Before that, perhaps I'll have a small beer.

Looking froward to seeing you on March 15th

Chris Price

February 2021