Industrial Revolution - Transcript

Rebecca Rideal: Welcome to the Sick to Death Podcast - A history of medicine in ten objects on display at our brand-new medical museum in the heart of the historic city of Chester. Buckle yourselves in, this is going to be a gory ride.

Theme Music: "Time" by The Broxton Hundred

William Blake:

And did those feet in ancient time,
Walk upon Englands mountains green:
And was the holy Lamb of God,
On Englands pleasant pastures seen!

And did the Countenance Divine,
Shine forth upon our clouded hills?
And was Jerusalem builded here,
Among these dark Satanic Mills?

Rebecca Rideal: Written at the turn of the nineteenth century, William Blake's famous line about Dark Satanic Mills, has often been linked to the extraordinary changes he and others living at the same witnessed in the world around them.

The Industrial Revolution, which began in England in the eighteenth century heralded a new era in urban labour, with huge new factories erected, remarkable pieces of machinery invented, fuel and transport revolutionized, and urban centres transformed beyond recognition. This era of mills, steam engines, factories, and mining, brought with it a raft of new medical problems and public health issues.

In this episode, we travel to the Industrial World. It is a place where life is cheap, work is hard and even the very water you drink can turn against you.

Let us first begin with our Sick to Death object.

Rebecca Rideal: Dean Paton Thank you for joining us again on the podcast. What objects do you have for us today?

Dean Paton: It's an unusual one today it's a medical replica of a set of lungs now they are not particularly the healthiest of looking lungs in the world, blackened and slightly shrivelled and these are a medical model of lungs which have suffered from years of smoke damage, perhaps it was a smoker but in this case it is someone who worked in a very industrial environment where there was a lot of coal smoke so inside obviously so a city or a place where there was a lot of soot and grime and this is something that very much shortened the lives of people in the industrial revolution, so it just gives you a visual indicator of what soot and smoke can do to someone's lungs.

Rebecca Rideal: We will explore the medical challenges presented by treacherous work places very soon. First, lets look at the impact of the industrial revolution on urban living.

Dr Deborah Brunton: Well what happened with the industrial revolution was suddenly you had to have industries that involved very, very, large numbers of people.

Dr Deborah Brunton: You go from a workshop with half a dozen people in to factories with hundreds of people in them and most of those are obviously in cities so it brings a lot of people from the countryside into the towns very very quickly and cities grow incredibly rapidly expanding at an incredible rate so what happens is that the new residents get sort of packed into the existing houses and new houses are built but basically the housing stock can't keep up with the number of new residents so you get terrific population densities. The other thing that happens of course is all of the kind of infrastructure that's dealing with waste starts to break down because if you imagine a town with 200 people in it and there is a river you can probably chuck all your rubbish in the river and it will disappear, but if you have a town with 2000 people in it, or 20000 people in it or 200000 people in it then that really is not going to work anymore the river is just going to get silted up with rubbish, old systems where the rubbish use to accumulate in the streets and get carted off once a year well that's not going to work when you have very large numbers of people either, so although town councils and urban bodies did their best basically it is very difficult to keep cities clean when you have such large numbers of people.

So cities are getting dirtier and they ate getting more crowded and those are the perfect conditions for disease to move through the population. So you get increasingly through the 19th century outbreaks of what was known as fever which was probably a mixture of things like Typhus which is spread by body lice so peoples sleeping ten to a room parasites can spread very rapidly from person to person or Typhoid which is spread by contaminated water supplies because the wells become filled up with dirt as well and people are still drinking the water so its very easy to spread around and you also get diseases that spread from person to person so you get epidemics of flu for the first time, you get childhood diseases spreading through the younger person population, small pox, measles, mumps, diphtheria, so basically you get a lot of infectious disease that just doesn't happen when the population is less densely packed in. These things did occur in the countryside but they were much worse in the towns.

Rebecca Rideal: In response to the unprecedented levels of poverty, overcrowding and disease the public health movement accelerated in the 19th century.

Julie Mathias: So from about 1750 – 1900 Britain's population rose by 300% from around 6 to 18 million. By the 1880's 80% of the countries inhabitants were urban dwellers.

Rebecca Rideal: That is Julie Mathias medical historian and author of a Social History of Sickness in London.

Julie Mathias: Throughout the 19th century there were major break throughs in medicine ranging from the arrival of anaesthetic in 1846 to the discovery of germs in the 1860's but despite these achievements medicine itself remained pretty stagnant. More problematic for the sick poor was getting access to healthcare. So on one hand there was more voluntary hospitals being built during the period but gaining admission was difficult and the cost of having a Doctor to your home would have been out of most peoples budgets. Diseases of especially the urban poor where often generated by the conditions they were exposed to for example, although it was not understood at the time to be caused by contaminated water but

when cholera rampaged its way through Britain from the 1830's it effected poor households because of bad drainage and water supply. Many health issues occurred out of malnutrition especially in children like Diphtheria , Scarlett Fever post more of a threat to undernourished kiddies and maternal deficiencies frequently lead to congenital deformities such as Rickets, Small Pox even after the vaccination was introduced remained endemic throughout the whole century and although the virus had no such social preference it certainly spread of fast pace in overcrowded communities.

Rebecca Rideal: The overcrowding had serious effects.

Julie Mathias: In terms of the actual living conditions of the sort of urban poor well they generally lived in what we refer to as slums and they were usually positioned quite close to the river but they had once been respectable homes to the better off but when the wealthy began to sort of migrate west in London the buildings became derelict and over the years sort of thieves have moved in and removed any sort of sellable interiors including fireplaces, windows etc. So by the time the poor had actually gained entry they were little more than open carcases, devoid of drainage, impossible to heat and cook in you would have like a cesspit that would generally be overflowing or broken or both, also the buildings lacked any exterior amenity such as street lighting or refuse removal. As bad as they were these premises could actually generate a substantial income I mean some people a slightly better off person would rent a whole house for a small sum and then sublet each room for a higher rate in order to sort of maximise the letters profit and to sort of minimise the occupants cost families of 5 or 6 would be typically sharing one room so obviously in very close proximity to each other where of course disease the spread of disease was much more prevalent.

Stephen McGann: Liverpool has got this over supply of crumbling Georgian very tightly packed housing stock rotting away, slums not only in the making but already maturing. And it was getting a lot post the slave trade years of the 1700's of Liverpool as abolition came in and Liverpool began to look towards more trade transatlantic. The emigrants from Ireland began to come over even before the famous potato family in the 1840's and began to cram the old Georgian housing of Liverpool in with the slums streets every two or three houses down you would have a little passage way going through which looked like it was going to the back of the houses but actually opened out into this filthy court behind the main street into which they crammed another 6 or 7 single room dwellings in which lived possibly a 150 soles in single rooms, no sanitation and two toilets at the end of these filthy courtyards, these courts, one or two single soil toilets basically open sewers where the children use to play. You could design a better vector for the spread of infectious disease.

Rebecca Rideal: In the early 19th century, an epidemic of cholera broke out in the Bengal region of India. The disease had blighted the region for centuries. With the increased movement of world populations as a whole and British military and merchant ships in particular, it didn't take long for it to spread. From India, it infiltrated the rest of south Asia, before making its way to the middle east, Europe, eastern Africa, north America, East Asia and beyond. Throughout the 19th century, tens of millions of people around the world died as a result of cholera. In Britain, the first epidemic of 1832, hit urban populations hard. But what was it? And how did authorities try and tackle it?

Dr Deborah Brunton: John snow was a very eminent practitioner in Victorian London. He is known for his role in public health, but he was also Queen Victoria's obstetrician and he delivered a number of princes and princesses. He is best known now for his role in discovering

how cholera was transmitted. Cholera was a terrible disease. It spread from India in a pandemic that went right round the world a number of times in the 19th century and there was a great debate about how cholera spread. Nobody knew about bacteria and viruses, so whether it's spread via water supply or whether it is spread through the air, and if it was spread through smells, bad smells arising from dirt was actually the cause of cholera. Or perhaps from particles in the air. Or perhaps some people were just particularly susceptible to cholera. There was a huge debate and there was absolutely no way of resolving it.

Snow, what he does is he starts to map where cholera cases are found – physically on a map of the Soho district of London – and he realises that they focus on one particular water pump in broad Street. He convinced local authorities to take the handle off the pump, so people can't use that well anymore… and a number of cholera cases declines. He published his results after the epidemic had passed on. Although it's a really seminal paper, at the time it was just one of many responses to cholera. So, although Snow had in fact hit on the actual transmission of cholera – it's a bacterium that lives in water and it is spread through the water supply – it wasn't generally accepted. There was a very gradual pick up of the idea. Snow publishes his ideas and 1850s but they really don't become generally accepted until the late 18 60s and buy them actually cholera had disappeared from Britain. So, he played a role in the disappearance of cholera, he is famous for being the man who really put his finger on the exact method of transmission, but in terms of actually stopping epidemics he helped but he wasn't really crucial.

Rebecca Rideal: There is another strand to the medical history of cholera in Britain. During the height of the 1932 epidemic a series of riots took place in Liverpool. Protesters were angry with the medical establishment and accused them of syphoning away bodies, and in some instances actually killing patients, to satisfy the demand for anatomical dissection. This was only a few years after the Burke and Hare bodysnatching scandal. With so many challenges, the process of cleaning up the cities took a long time.

Julie Mathias: In in 1832 a man named Edwin Chadwick was appointed by the government to help create a new Poor Law, because the older system was inadequate in meeting the demands of the ever increasing number of paupers. This new legislation introduced the workhouse system as a solution to reduce the local poor rates. Anyone that could not afford to keep themselves or their families would then have to enter into a workhouse to attain a help which included medical care as well.

Chadwick began to notice a strong link between poverty and disease, which of course was not a particularly new observation. But he monitored the situation and concluded that the demand on poor relief was often caused by ill health. So, in 1837, Chadwick appointed three doctors to investigate the London district with the highest mortality rate and their findings came back and they revealed that overcrowding, unsanitary conditions and squalor accounted for the main cause of illness and death among the poor. So then Chadwick expanded his research to include other urban centres in Britain and discovered a similar pattern occurring there and realised that in order to exercise and national system it would require creating a centric public health authority that would in turn be directed by local authorities to renew all areas of sanitary provision (including drainage, street cleaning, nuisances).

His efforts were acknowledged. In 1848 with the passing of the first public health act. However, although the act was passed by central government, it relied on local authorities actually implement it, which is really varied from place to place. It wasn't until a few decades

later, in 1875, that the former act was reinforced and made compulsory. So while public health in Britain was constructed during the 19th century, the transformation from an arbitrary system to a professional civil service was extensive but certainly not without its difficulties.

Stephen McGann: The general lesson is health problems are holistic, so you had to clean the water up. Well, if you're going to clean the water up, what do you mean by cleaning water? You don't just clean water, you have to clean the sewage, which means you have to put toilets in. If you're going to put toilets in, you have to give council houses to people. Once you get over council houses, you start to give people fresh air and gas in their homes and a toilet in their house. The minute you're doing that, you're leading the world in social health, which is what happened to Liverpool. But the waterborne viruses: the typhoid, the cholera, they will never go away unless you handle literally the nuts, bolts and pipes of public health, and that's what they did.

Rebecca Rideal: By the end of the 19th century a vaccine against cholera had been developed by Russian-Jewish bacteriologist Waldemar Haffkine. And research into the disease continued in earnest throughout the 20th century.

It wasn't just the urban squalor that posed risks to health during the industrial revolution, it was also the workplaces themselves.

Professor David Turner: I suppose in the first place there is increased risk of accidents, which are caused by a variety of things. So, in factories, we've got reports of people being injured by dangerous machinery. In coalmines, we have accounts of people being injured by roof falls and explosions, which are caused by digging mines deeper to try and win more coal. There's also an increased risk of disease in the Industrial Revolution as well. So, if you worked in a coalmine or a cotton factory, these are quite often very dusty environments and this could increase in lung diseases. Also, in new industrial towns, there's greater risk of epidemic disease caused by poor sanitation. So, diseases like cholera spread as a result of contamination of the water supply.

Also, people complained about general debility caused by the nature of industrial work, e.g. standing for long hours in factories was believed to prevent the young people's bodies from growing properly, and the hard work generally associated with industrial labour was also linked to premature ageing. It was said, for example, that a coalminer was old by the time he reached the age of forty. So, all these are dangers to the body brought about by the Industrial Revolution.

The nature of disabilities often depended on particular occupations. People said at the time that you could tell what kind of job someone did by the way they looked and what impairments they exhibited. Coalminers, for example, were susceptible to things like burns and debilitating lung diseases. Sometimes these diseases were known as miner's asthma so it was a disease particularly associated with coalmining.

Rebecca Rideal: The government set up commissions to investigate workplace accidents, one such was the 1842 Children's Employment commission.

Professor David Turner: In Cyfarthfa in Merthyr Tydfil there's a boy called Evan Gray. He's described as losing two of his toes, which were cut off as he ascended the coal mine. There is a 10 -year-old boy called Moses Gower, who worked at a coal mine attached to Treforest Tin Works. He was a gate boy, so his job was to open and close gates that let in fresh air underground, and he had his foot crushed when he was run over by a coal truck. In south

Wales was a boy called Giles Giles, who was fifteen and lost his right arm by falling under the locomotive engine.

So you get a real sense of the vivid accidents, which caused limb loss in some cases. We find similar stories being told in factories of children losing my fingers or having their bodies mangled by being caught up in machinery. In the matchmaking industry, for example, people got very ill because they were exposed to white phosphorus – one of the materials used in making matches – which cause a condition called phosphorous necrosis. It is better known as phossy jaw, which caused really striking disfigurements in match-workers and lead to the London matchgirls going on strike in 1888 to call for better safety in the workplace.

Rebecca Rideal: I'm curious to know how people reacted to the increased prominence of people with disabilities.

Professor David Turner: It's really important to note that disability is really common in industrial Britain. Sometimes perhaps we think about disabled people in the past as being shut away in institutions and being invisible in past societies, but that really wasn't the case. Visitors coming into industrial districts were often shocked by the numbers of people with missing limbs or artificial legs walking down the street. So, disability was a visible a normal part of life industrial Britain.

Disability also helps to make arguments for reform in working conditions. So the plight of disabled workers, particularly children, helped to advance the campaign for factory reform in the 1830s and 1840s. So, we find disabled factory workers brought to testify before Parliament in 1832 and some even showed their crooked limbs as examples of the poor conditions in which they worked. Disability's also important in recruiting people to the Labour movement. So trade unions in the 19th and 20th centuries spent a lot of their time fighting for better safety in the workplace and better support for injured workers.

What's a really interesting feature of the Industrial Revolution is that these calls for change in the workplace for better health and safety gave disable people a platform to tell their stories. The Industrial Revolution, I think, is really important in giving disabled people a voice for the first time in talking about their experiences.

These government enquiries in the 19th century are full of evidence given by disabled people that talk about their life stories and experiences. To give you one example, there is a girl called Eliza Marshall who was sent from Leeds to London when she was 17 years old, in the spring of 1832, to give evidence before the Parliamentary select committee about work in the factories. It must have been a very daunting prospect for her to travel all that way down to London and speak in front of an audience of MPs. But she told is incredible story about her life growing up in Leeds, how she'd gone to work in a factory at a young age but she believed it caused her to become disabled.

So, she describes how over time her legs became very stiff and crooked. She was in and out of the Leeds infirmary, she gets fitted up with a leg iron to try and straighten out her right knee. She carries on working throughout all this. She works as long as she possibly can. Partly, because her family aren't particularly supportive; she has a stepfather who makes a go out to work. She describes her mother crying as she goes off to work, but she doesn't really have any choice. She says that she must go to work or else starve in the streets. Her story really reveals a hardship faced by young workers in the industrial revolution. It also shows their resilience, the fact that disabled people were expected to work. But by the age of seventeen,

Eliza just isn't able to carry on working in the factory. It seems that by the time she gives evidence, she's trying to earn a bit of a living by doing some needlework.

Rebecca Rideal: In terms of support, there were a range of options available.

Professor David Turner: There were lot's of different kinds of support available. First and foremost, people were expected to be supported by their families. It was written into law that families were meant to look after their own relatives if they possibly could. In Eliza's case, she talks about her stepfather be unwilling to do that, so this is a problem.

Outside of the family, as a last resort you could go to the Poor Law and that might provide some support for you to get a medical care or supplement your income, if you weren't able to support yourself through your own work. People were meant to, or encouraged to, take responsibility for their own welfare, medical care, in the Industrial Revolution. So, we find lots of things called Friendly Societies being established in this period. So, workers were supposed to join these, they pay part of their wages as subscription and if they needed support during sickness, whether that was financial support or medical support then, as long is there to keep their subscriptions, they were able to draw on that for some help.

They were particularly geared up for people with long-term health condition. So, they might be okay if you are off work for a few weeks, but if you had something more disabling or a chronic condition, which might affect you for a long time, then payments actually went down over time and many Friendly Societies stopped paying you after a year or so.

There's also cases of private charity as well for people with disabilities to try and help them to get a new occupations, for example, or to buy essential medical equipment. So, a visitor to the Welsh town of Merthyr Tydfil in 1857 said that when he arrived in the town, he was asked to buy a raffle ticket to help raise money for an injured youth to help him buy a wooden leg. We also have cases of people being supported by their communities, of people raising money to help to buy equipment and give people a new start in life after disability. So there's an emphasis on not shutting people away in institutions, but giving them money to help support them become economically independent.

Rebecca Rideal: When it comes to hearing impairment during this time, we know of famous names such as Beethoven who suffered with hearing loss during his life. But there is a bigger history to tell. In France, abbe and educator and Charles Michel de l'Epee devoted his life to improving access to education and communication for the hearing impaired.

Dr Jaipreet Virdi: So, Charles Michel de l'Epee was a French barrister and educator and around 1730, 1740, he met two deaf children, two deaf girls actually, who needed a new educator. So, he decided to sign on at their private tutor. So, eventually, in 17 60, he founded it on school for deaf in Paris in decade before the French Revolution. And his idea was that deaf children could learn to read and write much like any other hearing child. What de l'Epee wanted to do was use the school to offer free education for any deaf child that needed one. This was primarily because, for the most part, deaf education was a private enterprise only accessible for wealthy children.

So, in this way, by offering a school for any deaf child who wanted it, de l'Epee wanted to prove his view that deaf children could actually go out and live productive lives and become self-sufficient French citizens, if they have education. So this is a remarkable idea at the time because he was arguing that we need to move away from this kind of social images of dependency, charity and begging that was offering a custom in French society.

Rebecca Rideal: Sign language have been used for centuries by the deaf community.

Dr Jaipreet Virdi: de l'Epee's development with sign language was essentially a form of communication. So, how do you teach using the natural signs that these children had and give them a more systematic education? He developed what is known as methological sign, which is a bridge between between spoken and sign language. So, in other words he used to children natural French sign and could use that in the syntax of spoken French. So in other words, the way his process worked was he would sign each letter of the French alphabet, usually through finger spelling, so you trace letters on a pupil's hand and then spell out the word completely, or writing letters on a chalk board, and in this way these letters become printed words. Then the students through routine, memorisation and repetition made use of the natural signs that children already had, but transformed it into a manual version of spoken language that they could understand and therefore develop more complicated ideas.

Rebecca Rideal: While sign language has been developed and spread, acoustic aids were being created too. The story of their development runs alongside that of the technological revolution.

Dr Jaipreet Virdi: Until the late 19th century – and actually, even some decades after – most hearing aids were of the mechanical type. In other words they were trumpets or simple sound conducting devices that were used to basically amplify noise. But around the early 19th century, some manufacturers based in England started developing more intricate versions of these trumpets. So, they created acoustic aids that could be concealed. So, a trumpet small enough that you can hide it in a hat or for women to hide it in her bouffant hair style. Or even some large table top trumpets that could be concealed as a vase or a fan or just an ordinary product.

So hearing aids, again, were very mechanical. They operated on very simple patterns of a sound conduction and amplification.

Rebecca Rideal: Let's move onto modern hearing aids

Dr Jaipreet Virdi: Even though mechanically hearing aids, or more accurately mechanical acoustic aids, were quite popular, they were basically use for a wide array of hearing loss. By the late 19th century, with all these experiments on carbon microphone and the telephone, inventors started tinkering with this idea about sound transmission through electric wires. So the first electric hearing aids were actually developed in 1892 by Ádám Politzer of Vienna and he made use of an ordinary telephone receiver and converted it by connecting you to a carbon microphone and fastened it to a battery box. It wasn't a very big commercial success, primarily because the sound clarity wasn't clear. It made a crackling noise with the electric current sound, but five years later, in 1898, American engineer Miller Reese Hutchison patented a new device that he named Akouphone. It was a large table top hearing aid that again made use of similar technology as the telephone, and it was connected to a battery. From then on, during the twentieth century, there would be more innovations and more modifications for the electric idea, but devised to improve sound quality as well as reduce thee size of electric hearing aids. So we went from large table top boxes to electric hearing aids that could be worn on the body. Then eventually, during the late 20th century, behind the ear.

Rebecca Rideal: In the next episode we'll travel deeper into the innovations of the nineteenth century.

With thanks to today's guests: Dr Deborah Brunton, Julie Mathias, Stephen McGann, Professor David Turner and Dr Jaipreet Virdi. This series was written, narrated and produced by myself, Rebecca Rideal, it was edited and produced by Peter Curry, and was brought to you by Sick to Death.