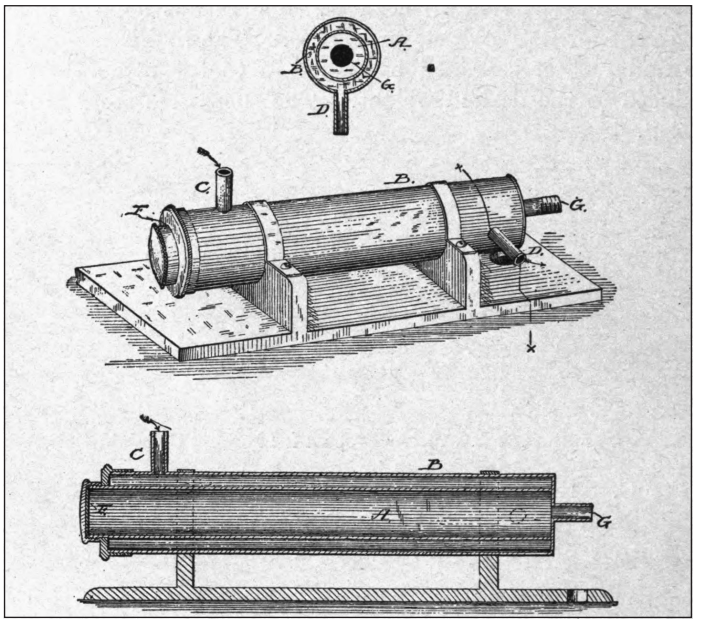
minded' customers to draw pistols and stand ready to shoot. Celluloid-based shirt-fronts, aka dickies, were very popular for their enduring whiteness and water-resistance but there was the odd accident with hot ash falling from cigars. Mothers, used to chastising wayward offspring with their old-fashioned wooden hairbrushes continued to do so with their bright and shiny new celluloid ones, sometimes giving little Johnny a great deal more to think about than perhaps he deserved. And then there were the false teeth . . .

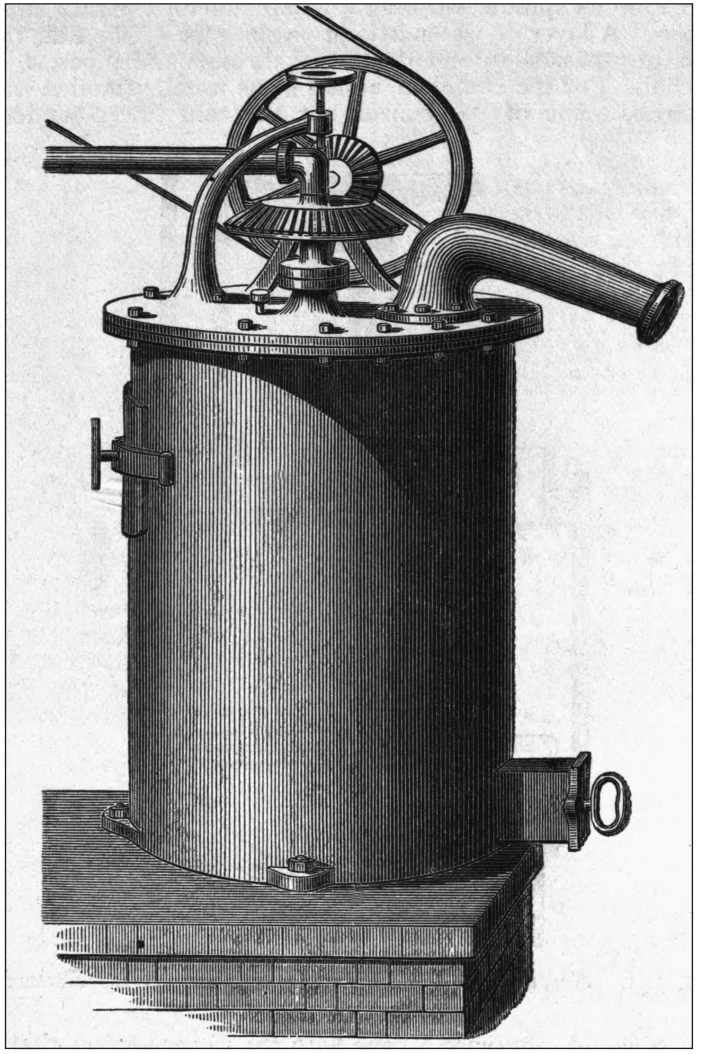


The Hyatt Gun Method of celluloid billiard ball manufacture

A WHALE OF A TIME

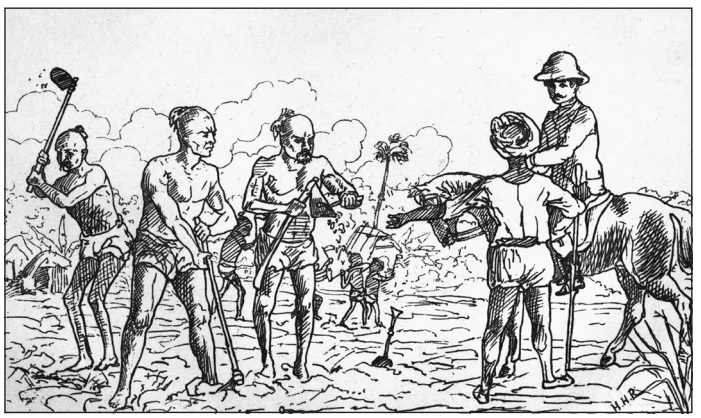
London-born Robert Chesebrough (1837–1933) was a young chemist who ran a factory making fuels from oil harvested from sperm whales when the Oil Rush of 1850s America put him out of business. The first strike had been made in Titusville, Pennsylvania so, reasoning that was the place to be, he booked passage on the first available ship for America to see if he could at least get a job there and learn about the new business. The first thing he noticed was that any driller or rigger who injured himself would cover the wound with some of the thick gunk that always came up on the drilling rods when they were extracted from the ground. Furthermore, he noted that the wounds and burns did indeed seem to heal much faster than if left unattended.

Fascinated, he gathered up samples of the gunk and set up a workshop to refine the gel and make it lighter in colour and purify it to be more pleasing to the eye without diminishing its curative effects. His first attempt at marketing Rod Oil was not a success so he came up with the rather more acceptable name of Vaseline, a compound of the German for water and the Greek for oil.



Apparatus for making aniline

they had bullied native planters to expand to an incredible three million acres. Crops such as tobacco or rice were 'discouraged' in vast reaches of Bengal by such brutal methods and tactics that it was rightly said that 'not a chest of indigo reached England without being stained with human blood'. An incredibly popular dye, the British made millions from the business while paying the growers next to nothing. Adolf von Baeyer (1835–1917) of the University of Berlin had been prompted to research the structure of indigo to see how it could best be synthesized, and so break the virtual monopoly held by the British. This he achieved by 1883 but none of the synthetic indigos could be produced within a cost-structure to rival the natural product. This work would nevertheless make him, in 1905, the first Jew to be awarded a Nobel Prize.

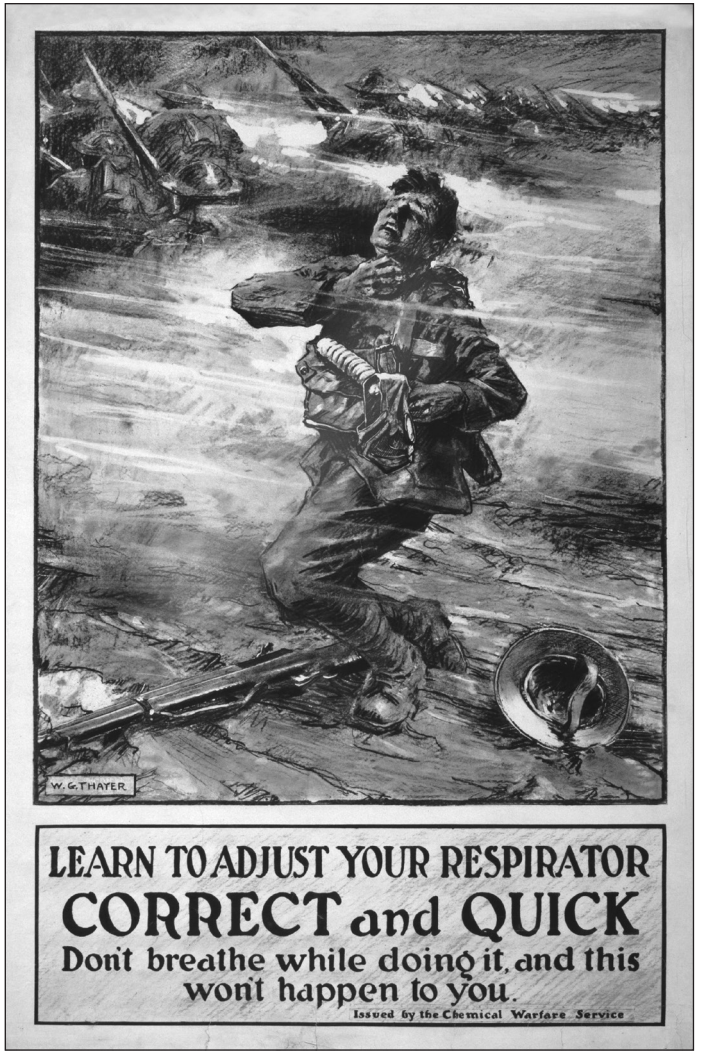


Digging lands for indigo

corrosive to deploy otherwise he might have rid the Third World of the Third World itself. But others picked up on his work, including the British Frederick Guthrie (1833–1886) who messed around with the compound in 1860, with Viktor Meyer (1848–1897) publishing a paper in 1886 after combining chloroethanol with an aqueous solution of potassium sulphide before jazzing up the mix with some phosphorus trichloride, just for good measure. Meyer had magnanimously tested the results on one of his assistants who ran around screaming in such an unmanly manner that Meyer thought he was hamming it up. But, after killing a few rabbits with the mix, he was convinced.

A MIX UP

The final tweak came in 1913 when Hans Thacher Clarke, a Brit working in Berlin with Emil Fischer, decided to replace the trichloride with hydrochloric acid and set the mix aside while he was distracted on other projects. Sometime later, as Clarke lifted the now matured mix from its resting place, intending to dispose of it, someone shouted to him from across the lab causing him to drop the flask, nearly killing himself and everyone else in the room. As Clarke was rushed to hospital, where he would remain for nearly three months, Fischer, who had witnessed the accident, was on the phone to contacts in the German Army, which had a production line in full swing before Clarke was back on his feet.



A poster published by the Chemical Warfare Service in 1915

Penicillin

No one knows who first discovered the curative powers of moulds; in all likelihood there was no one single discovery, rather the chance observation of injured people grabbing anything to hand to staunch their wounds and a broad and slow-growing realization that those who used mouldy bread seemed to do better than others. The Ancient Greeks, Serbians and Indians all record the deliberate use of mouldy bread but, again, all such records imply that they knew nothing of the mechanism nor opted for any particular mould. The first mention of people deliberately growing a specific mould on a particular host for medical use comes from Sri Lanka, where records show that soldiers in the army of King Dutugemunu (ruled 161–137 BC) would set aside

patties of an oil-based cake when battle seemed imminent and then take the mouldy results on campaign to be used as field dressings.

P IS FOR PADDINGTON

We know from the writings of Henryk Sienkiewicz (1845–1916) that it was the accepted practice in early seventeenth-century Poland to harvest spiders' webs that were contaminated with spores and mash them up with damp bread to serve as dressings; he explains the practice and gives the date reference in his *With Fire and Sword* (1884); he also wrote *Quo Vadis* (1895), filmed in 1951 as a sword-and-sandal epic. There are countless seventeenth- and eighteenth-century references to moulds in general being used to treat infection but the first solid, pre-Fleming reference to penicillium crops up in the 1809 writings of the German scientist, Johann Link (1767–1851), who not only coins the name from the Latin for a painter's brush, reference to the frond-like structure of the mould, but also describes three specific species: *P. candium*, *P. expansum* and *P. glaucum*.

On the domestic front, Sir John Scott Burdon-Sanderson, Medical Officer for Paddington – a place-name that seems to run a thread through the story – wrote in 1871 that the presence of penicillium inhibits the growth of bacteria. In that same year, a nurse at King's College Hospital

Darwin: The Accidental Tourist

Of all the accidental and serendipitous discoveries, innovations and advances in thinking, that which led Charles Darwin (1809–82) to eventually arrive at the conclusions he did has to be one of the most famous. But certain things should be understood at the outset: theories of evolution were nothing new in Darwin's day; musings on the subject date back to Ancient Greece, and even his own grandfather, Erasmus Darwin (1731–1802), among many other notable names, had written extensively on the subject. As for Darwin, he spent the entire voyage on HMS *Beagle* with his mind on other matters and, far from his having had the eureka moment of popular imagination on the Galapagos Islands, he spent his short

and unenjoyable visit blithely ignoring what was staring him in the face and killing and eating the unique specimens that could have taught him so much – but then he was very young.

It is a fair bet that most readers, if asked to shut their eyes and conjure up an image of Charles Darwin, will have in their imagination a picture of a serious old chap with a long and bushy grey beard, glowering in a chair, or some such. But Darwin was still a rather spoilt and somewhat closeted twenty-two-year-old when HMS *Beagle* sailed and, far from anticipating a scientific expedition, he was at the time a devout Creationist aiming to settle down to the quiet life of a country pastor. He was not invited along as the expedition's naturalist but as a dinner companion for the Captain. He hated the Galapagos Islands where he largely ignored the unique flora and fauna in his search for geological samples. (All the myths built round the so-called Darwin finches and transmutation of species would come later.) And, apart from all that, chance had to work a great deal of its magic just to get him on to the decks of HMS *Beagle* in the first place.

FIRST SIGNS OF MADNESS

The story starts with the less-than-balanced Robert Stewart, Viscount Castlereagh (1769–1822), a close relative of Captain Robert Fitzroy (1805–65) who would later invite Darwin to join him aboard HMS *Beagle*. Ever-volatile, Castlereagh, over