

# What's your potion? A very brief history of drugs

We all know that potions have been used for millennia, but much of the modern pharmacopoeia was developed in our lifetime, and each prescription issued seems much more useful than those of even 40 years ago.

**Dr David L Simon**, director of Scientific Services for SA Health, takes a look at the history of drugs.



**S**OMETIMES, under the skies of a dreary grey day, you may ponder whether any good can come from an endless

stream of young and old passing through the clinic, each clutching a 'script' as they leave. Yet it appears that each prescription is much more useful today than it was even just 40 years ago. Those of us who are a little older (my teenagers tell me I am more than a little old, but not yet ancient), can recall that only 30 or 40 years ago, the notion of a drug receptor was just that – a notion. Atherosclerotic plaques killed people with relentless monotony and we worked with the belief that peptic ulcer disease was mainly a stress-related disorder.

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Of course, we all know that potions have been used for millennia, but have you considered that much of the modern pharmacopoeia was developed in our lifetime? For some, it revolves around chemistry or perhaps medicine. But in reality, it was the unravelling of the paradigm of pragmatism, philosophy, mysticism and superstition – the foundation of medicine for thousands of years – that allowed us to progress from potions to medicines. The hurdle was eliminating the link between mysticism and illness and allowing, for example, post mortem examinations to take place.

The Ebers Papyrus, which reached the West through Edwin Smith (who had a rather colourful history), revealed that the ancient civilisation of Egypt had many herbal remedies – of which most were of dubious origin. However, one stands out – an extract of salix or willow – the origin of aspirin thousands of years later.

Science by experimentation, especially medical science, had to develop before medicine could untangle itself completely



An antique illustration of the scene outside a Japanese apothecary shop, engraved by Charles Laplante.

from mysticism. From before the times of the ancient Egyptians, it was believed that illness was uncontrollable by humans. To move forward, causality needed to be defined in the physical world. Mathematicians managed this during the Renaissance with great names such as Copernicus (1473), Kepler (1571) and Newton (1643) springing to mind, but the physiologists took somewhat longer to accomplish this.

The observation that dose had something to do with magnitude of effect was recorded by Theophrastus Philippus Aureolus Bombastus von Hohenheim, (1493), whose name was fortunately shortened to Paracelsus. Although in some ways a mystic, Paracelsus made careful observations and proposed strategies to reduce the ravages of occupational disease resulting from dust exposure. Dose was crucial; the lower the dust levels, the smaller the effect. Claude Bernard (1813), whose observations and anecdotes adorn all great pharmacology texts, was one of the true experimental scientists. He had no qualms about dispensing with prevailing theories and developing new ones, irrespective of the great names that held the doctrine of the time.

Drugs magically 'fell from the sky' as penicillin did – or at least the *Penicillium notatum* fungus that produces penicillin – or were extracted from plants or made from minerals. The compounder of medicines was the physician, herbalist and priest, all rolled into one. From here the apothecary arises: 'O true apothecary! Thy drugs are quick. Thus with a kiss I die' (Romeo and Juliet). The cynic may believe him to be a 'spice-seller', but perhaps he was a medical man – for in time, he was to become the physician or pharmacist. The history of the development of drugs, which cannot be separated from the history of medicine, can be found engraved in the various editions of the great pharmacopoeias – herbal books at their inception and now vast tomes, or DVDs, of complex molecules.

Engineering is an applied science that laid the foundation of the Industrial Revolution. The more efficient the steam engine, the more wealth it produced. However, while marvelling at the wonders of the mechanical age one can miss the rapid development of new compounds. Friedrich Wohler (1800) comes to mind. He synthesised urea, setting in motion the discovery of a number of important

advancements, such as refuting the notion that compounds from living things were different from all others because they contained a vital (and non-synthesisable) force. With the birth of organic chemistry came a proliferation of new compounds. By 1880, over 10,000 new compounds had been synthesised, including phosgene, mustard gas, chloroform, diethyl ether and carbonic acid. War, of course, always helps. Along with the ability to manufacture organic chemicals came many discoveries including the hormones – adrenaline (1897), histamine (1919) and insulin (1926) to name just three.

Experimental medicine advanced by using animals and humans. Friedrich Sertürner (1783), known for isolating morphine, anecdotally, administered 100 mg of the pure alkaloid to himself and some of his friends. Needless to say, they spent several days recovering from severe opiate poisoning.

Drugs were usually found accidentally or serendipitously. However, in 1975, a more rational approach produced drugs such as captopril which came from examining

the angiotensin-converting enzyme it inhibits. A knowledge of the existence of drug receptors is no longer enough; an understanding of their intimate details is now required to optimise the development of new drugs. Few of us had heard of molecular biology in the 1960s or 70s, but I can still remember the first human insulin going on sale and, of course, the unravelling of the human genome.

Where do we go next? Many things are plausible, but not all are possible. Some solutions will require re-invention, such as dealing with antibiotic resistance, and fields such as oncology will continue to engage our intellect to its fullest extent. But history has shown us that those scripts do more good than ever before, and in the future, their efficacy can only improve.

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