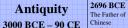
# **Lessons Learned: Milestones of Toxicology**

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The Father of Chinese medicine, noted for tasting 365 herbs and

Shen Nung

said to have died of a toxic overdose

# Ebers Papyrus

1500 BCE Egyptian records contains 110 pages on anatomy and physiology, toxicology, spells, and treatment. recorded on papyrus

## Gula 1400 BCE Sumerian texts refer to a

female deity, Gula. This enic tale of The Odyssey mythological figure was and The Iliad. From Greek associated with charms. torikon arrow poison spells and poisons

## 850 BCE Wrote of the use of arrows noisoned with venom in the

Socrates (470-399 BCE) Charged with religious heresy and corrupting the morals of local youth. Death by Hemlock - active chemical alkaloid coniine

Hippocrates (460-377 BCE) Greek physician. observational approach to human disease and treatment, founder of modern medicine named cancer after creeping crab

Mithridates VI (131-63 BCE) Tested antidotes to poisons on sicariis et himself and used prisoners as guinea pigs. Created mixtures of substances eading to term mithridatic

L. Cornelius Sulla 82 BCE Lex Cornelia de veneficis - law sell or possess poisons

Cleopatra against poisoning people of prisoners; could not buy,

(69-30 BCE) Experimented with strychnine and other poisons on prisoners and poor. Committed suicide with Egyptian Asp.

Dioscorides (40-90 CE) Greek pharmacologist and Physician wrote De Materi Medica basis for the modern pharmacopeia.

Pedanius

Mount Vesuvius Erupted August 24th 79 CE City of Pompeii & Herculaneum destroyed and buried by ash. Pliny the Elder suffocated by volcanic gases.

Middle Ages 476 CE - 1453 Greek Fire 673 CE Ancient 'nanalm" described by the rusaders as consisting of nantha quicklime sulphur & saltpeter

**Ergot Outbreak** 994 CE 40,000 died from esting contaminated wheat/rve caused gangrene - known as St. Anthony's Fire.

Moses Maimonides (1135-1204) **Jewish** nhilosopher & physician wrote: Treatise on Poisons Their Antidates

Albertus Magnus (1193-1280) Dominican friar wrote extensively on compatibility religion and science and isolated arsenic in 1250. Raymundus Lullius 1275 Ether discovered

w Spanish later called Knights Templars (1118-1307)

Christian military order alleged to be experts with oisons. They searched for the "Elixir of Life"

Petrus de Abano (1250-1315) Italian scholar ranclated lippocrates and Galen to Latin. Wrote book on poisons: De Venenis

The Black Death (1347-1351) Bubonic & nneumonic plague ravaged Europe leaving the highest number of casualties in history

Venetian Council of Zhou Man Ten - 1419 1423 Chinese explorer people who lost 1000s of crew carried out nembers from uranium murders with poison for a in Jahiru Australia

Cesare Borgia (1400-1500) exposure while mining lead Used arsenic in a concoction called "La Cantrella"

Rodrigo & Poisoned many people in Italy for political and monetary gair

Renaissance 14th-16th Centuries

Leonardo de Vinci (1452-1519) Experimented with bioaccumulation of poisons in animals and called the procedure "passages".

Pope Clement VII (1478-1534) Died (possibly murdered) after eating amanita

Phalloides, (death cap)

mushroom.

Paracelsus (1493-1541) "All substances are poisons: there is none which is not a poison. The right dose differentiates a poison from a

Georgius Agricola (1494-1555) Wrote De Re Metallica published 1556. The most comprehensive book on mining and metallurgy.

Catherine Medici (1519-1589) Queen of France expert assassin. tested poisons on the poor and the sick.

William Piso 1640 In Brazil, studied effects of Cephaelis Ipecacuanha, an emetic: treat dysentery

Shakespeare (1564-1616) From Romeo & Juliet - act 5 "Here's to my love! O true apothecary! Thy drugs are quick. Thus with a kiss I die.

Hieronyma Spara ~1659 Roman women & fortune teller organized wealthy wives and sold them a arsenic elixir to murder their husbands

Catherine Monvoisin (LaVoisin) (1640-1680) Accused sorcerer and convicted poisoner in France She was burned at the stake.

(1635-1719) Italian woman who supplied poison (arsenic) t wives looking to murder their husbands. Later executed by strangulation.

Guilia Tophania

King Louis XIV 1682 Passed royal decree forbidding apothecaries to sell arsenic or poisonous substances except to persons known to them.

1700s

**Devonshire Colic** John Jones 1701 English doctor wrote The Mysteries of Opium incidence of lead Reveal'd described many treatments of onium, but also contaminated cider withdrawal and addiction

Richard Meade (1673-1754) In 1702, wrote A Account of Poisons dedicated to poisons snakes animals and plants

Carl Wilhelm Scheele (1742-176) Swedish apothecary and chemist discovered oxygen. barium, chlorine, manganese and vdrogen cyanide

Percivall Pott. (1714-1788) British physician who recognized coal-tar caused cancer of the scrotum in chimney sweeps. Chimney Sweepers Act of 1788

Felice Fontana 1767 Italian chemist and physiologist who was the first to study venomous snakes. Discovered that viner venom affects blood Freidrich Serturner (1783-1841) solated an alkaloid From opium poppy it Marnhine after Mornheus, the Greek god of dreams.

Françoise Magendie (1783-1855)Discovered emeting and studied effects of strychnine & cyanide, Called

Fowler's Solution 1786-1936 otassium arsenite solution prescribed as a general tonic and used from about 786 to 1936 Used by Charles Darwin'

Pierre Ordinaire 1797-1915 Created elixir using absinthe popularized and sold by Henry Pernod Absinthe was used by Vincent Van Goob, banned in 1915, subject of Dega

Mateu J.B. Orfila (1787-1853) onsidered the father of modern toxicology. In 1813 he published Traite des Paisons which described the symptoms of

1800s

(1785-1859) English writer became addicted to opium in early published Confessions of an Opium Eater in 1821.

Thomas de Quincey

1700's

Devonshire.

England, High

colic drinking

James Marsh (1794-1846) Chemist developed and perfected the Marsh test for arsenic The improved Marsh test was used forensically for the first time in 1840 during the

trial of Marie Lafarge.

1930). Law prevents

medicines, and liquors

2.4-D - 1946

Developed during

WW II at British

Experimental

Station, by J.H. Quastela

and sold commercially in

luction or trafficking

or poisonous foods, drugs,

**Robert Christison** (1797-1882) Toxicologist at University of Edinburgh wrote Treatise or Poisons in 1829; invented poison harpoon for whaling that contained prussic acid.

Claude Bernard (1813-1878) French physiologist studied the effects of carbon monoxide and curare. Influenced by

Françoise Magendie

Ascanio Sobrero (1812-1888) Italian chemist, in 1847 discovered nitroglycerin, a powerful explosive and vasodilator. Alfred Nobel was his student

Theodore G. Wormley (1826-1897) Wrote the first American book poisons in 1869 entitled: Microchemistry of Poisons.

Joseph Caventou & Pierre Pelletier 1820 quinine from bark of Cinchon tree in back of their pharmacy

Required arsenic to be colored with soot or indigo to prevent accidental" poisoning. Friedrich Gaedcke 1855 Isolated cocaine from Erythroxylon coc

Arsenic Act 1851

**Louis Lewin** (1854-1929) German pharmacologist tudied and classified hallucinogenic plants, alcohols and other psychoactive compounds. **Emil Fischer** 1852-1919 solated the stimulant caffeine

Constantine Fahlberg Saccharin - 1879 Constantine Fahlberg discovered saccharin while working in the laboratory of Ira Remsen (right)

1900-1930s

**Upton Sinclair** (1878-1968) Published The Junele Chronicled the unsanitary conditions in meat packing industry in Chicago.

Pure Food and Chemical Warfare A U.S. Prohibition Reality 1915 Drugs Act - 1906 Wiley M.D. (1844-

chemist Fritz Haber (1868-1934) developed blistering agents used in WWI; chlorine and cyanide gases

1919-1933 Law that made the production and sale of alcoholic beverage illegal but very profitable.

Geneva Protocol 1925 Ranned use of chemical weapons. Updated in 1993 as the "Chemical Weapons Convention" to include banning production.

Ginger Jake 1929 Alcoholic tonic produced illegally during prohibition adulterated with TOCP roduced OPIDN (Jake Leg), affecting 50.000 adults.

Hawk's Nest Incident 1927-1935 Hundreds of black workers die from acute silicosis while digging tunnel for a

vdroelectric project

for Union Carbide.

9 founders, 183

charter members).

Gerhard Schrader (1903-1990) German Chemist made nerve agents; sarin, tabu soman, and cyclosarin while developing insecticides 1938: agents used in WWII.

Elixir Sulfanilamide 1937 Food Drug & Cosmetic Act 1938 100 die, diethylene

glycol as a vehicle

Albert Hofmann 1938 Lysergic acid (LSD) synthesized in the Sandoz Laboratory (now Novartis). In 1943 Hoffman tested LSD on himself

Marijuana Tax Act 1937 Federal criminal offense to possess produce, or dispense hemp, Non-medical use prohibited in California (1915) and Texas (1919).

1940-1960s

**DDT - 1939** Recognized as insecticide by the Swiss scientist Paul Hermann Müller who was awarded the 1948 Nobel Prize in Physiolog and Medicine. Banned in 1972

Minimata Japan

with mercury by ch industry. Thousands adults and children were poisoned 1946. Used to control from eating fish contaminated Poison Control Journal of Tox. & Centers 1953 Adopted by SOT until 1981

App. Pharmacology when SOT Frances Kelsey founded Fundamentals of of FDA blocked Applied Toxicology approval in U.S.

Thalidomide | (1959-1960's) Drug prescribed to pregnant women for morning sickness induced birth defects

Society of Toxicology 1961 Founded March 4, first formal meeting held April 15, 1962

Alice Hamilton (1869-1970) irst female faculty member at Harvard Medical School A worksite chemical hazards with disease. Studied effects Rachel Carson (1907-1964) Scientist lead (DDT) a pesticide and ersistent organic pollutant

Occupational Safety & Health Act 1970 29, 1970 to ensure every worker a safe and healthful workplace. arson several books including Silent Spring published 1962.

U.S. EPA Established to consolidate federal research, or monitoring, standard-setting and enforcement activities to

1970-2006

Symbol adopted y the Pittsburgh Poison Center at The Children's Hospital in 1971. Used to educate children and parents about poisons and to prevent accidental poisoning

Mr. Yuk

Iraq - Mercury Pinkcolored seed grain coated with a mercury fungicide was tragically consumed by Iraqis tragically affecting over 40,000 people.

Arsenic poisoning alt Affin Tubewells. frilled to provide clean drinking water, are ontaminated by arsenic esulting in millions of

people harmed.

Bangladeshi 1970s

First Modern Toxicology Textbook 1975 ouis J. Casarett & John Doull edited Toxicology: The Basic Science of Poisons, in 1975.

NC in 1954, and third

opened in Boston 1955.

First Chicago

at Duke

University.

Love Canal Disaster August 7, 1978 JS President immy Carter eclared Love Canal a federal emergency, 42 million pounds of over 200 chemicals contaminated Love Canal. disrupting many lives.

**IUTOX 1980** nternational Union of oxicology American Board of Toxicology (ABT) 1979 - First exam Aug. 1980 Academy of Toxicological Sciences (ATS) 1981

Times Beach 1983 Dangerous levels of dioxin liscovered in Times Beach, MO. EPA orders the town evacuation and makes it a Superfund site. All residents gone by 1985.

**Bhopal Disaster** Dec. 3, 1984 Accidental release 40 metric tons of methyl isocyanate from a Union Carbide Indian pesticide plan in heart of city resulted in the killing thousands, and injured

Chernobyl Accident April 26, 1986 The Chernobyl nuclear power plant accident produced a lume of radioact debris over the Ukraine, Eastern Europe, Scanding eastern USA

Tokyo Subway Sarin Gas Attack 1995 Members of religious group released sarin gas in 5 places in Tokyo subway, killing 12 and injuring 6,000.

A nonsteroidal anti-inflammatory COX-2 selective inhibitor for reatment of osteoarthritis produced by Merck & Co. nd voluntarily withdrawn because of risk of heart attack & stroke.

## Historical Milestones and Discoveries Which Shaped the Toxicology Sciences

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Knowledge of the toxic and healing properties of plants, animals, and minerals has shaped civilization for millennia. The foundations of modern toxicology are built upon the significant milestones and discoveries of serendinity and crude experimentation. Throughout the ages. toxicological science has provided information that has shaped and guided society. This poster presentation examines the development of the discipline of toxicology and its influence on civilization by highlighting significant milestones and discoveries related to toxicology. The examples shed light on the beginnings of toxicology, as well as examine lessons learned and re-learned. This project is also an effort to examine how toxicology and the toxicologist have interacted with other scientific and cultural disciplines, including religion, politics, and the government. Toxicology has evolved to a true scientific discipline with its own dedicated scientists, educational institutes, sub-disciplines. professional societies, and journals. It now stands as its own entity while traversing such fields as chemistry, physiology, and pharmacology. We invite you to join us on a path of discovery and to offer your suggestions as to what are the most significant milestones and discoveries in toxicology. An interactive version of the poster is available at www.asmalldoseof.org.

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