

ammoniated mercury with melted hydrogenated oils. The data are shown in Table III. All of these ointments possessed bacteriostatic properties; those prepared with hydrogenated oils being greater than the official ointment prepared with petrolatum, wool fat and wax.

SUMMARY

Ointments of phenol, boric acid and ammoniated mercury were prepared, substituting partially hydrogenated oils for the official ointment base. Bacteriological tests with these ointments using *Staphylococcus aureus* as the test organism indicated that boric acid or phenol ointments prepared with the official base or with hydrogenated oils possessed no bacteriostatic properties.

All ointments of ammoniated mercury were bacteriostatic. Those prepared with hydrogenated oils were superior to ointments prepared using the official base.

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Poisons and Poisoners*

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Poisonous substances have been known since ancient times but, as is true of many things, no one knows who first recognized materials possessing such properties nor when such discovery was made. Some surmise that shepherds and others observed that browsing animals regularly avoided certain plants although they ate others growing in juxtaposition to them. Undoubtedly primitive man had personal and unfortunate experiences as a result of contact with, or of consuming, certain plants.

The word poison harks back to the Latin *potio*, a drink, draft, potion—thereby relating it to pharmacy and medicine—with the connotation of a noxious or

deadly drink. It has come to denote the active or deadly agent itself rather than a solution or other dilution of the harmful substance. And since poisons are the *raison d'être* of the science of toxicology it may be mentioned in passing that the root "tox" has been traced to an ancient word meaning "bow" or "arrow," or, in a very broad sense, to a tool or implement used in killing. From this some have made the deduction that man's first knowledge of poisons concerned natural septic poisons, because many primitive peoples smeared their arrows, spears or other weapons with the blood or other parts of animals previously slain, and which therefore probably were infected. Experience taught them that wounds inflicted with missiles thus prepared proved more generally fatal than did those occasioned by clean weapons. With such observations as a basis, primitive man dipped his arrows in various juices, brews and concoctions of harmless and harmful agents and then noted the results of his experiments. Why some of the things he smeared on his arrow tips seemed to be more effective in killing animals or enemies, while others were ineffective, he did not know; the phenomenon therefore constituted a mystery which he ascribed to the supernatural and regarded with superstitious awe.

According to Lewin, only few favored men, priests and rulers, in ancient times, knew any poisons or their properties, and he reasons quite logically that conditions of early times were similar to those which exist at present among the primitive peoples of Africa, India, Guiana, West Indies, Brazil and other countries, where the fetish priests and chieftains have a knowledge of such substances. These men prepare the poisons and administer them to persons accused of crime, who thereupon are required to submit to the ordeal in which Providence ostensibly intervenes in favor of the innocent, but punishes the guilty by death. The actual outcome is dependent upon the wish of the one in authority. It is stated that in cases in which the ordeal (calabar) bean is given to one accused, the priest or chieftain selects a good, active bean, or one that he knows to be innocuous, to the end that the recipient shall die or live, as the "medicine man" elects. Lewin states incidentally that in the Fiji Islands there are professional poisoners (*Todesmänner*) who secretly administer cumulative cardiac poisons.

According to some versions, poisons received attention in Greek mythology. Hecate, who is confused with other goddesses, and whose parentage is not clear, is said to have had the power to confer upon mortals, also to withhold from them, certain favors and blessings, and to have had command over all the mystic powers of nature which included wild plants possessing medicinal as well as toxic properties. The treatment of certain diseases, also of snake bites, came within her sphere of activities. She is said to have discovered poisons.

Aconite, named after a small town in Heractea, according to a myth, was the foam from Cerberus, the 3- to 50-headed dog that guarded the entrance

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to the infernal regions. Medea, the wife of Jason, the hero of the mythical argonautic expedition, is related to have saturated the wedding dress of her rival, Glauce, with poison, thereby causing her death.

Poets also sang about poisons, as did Ovid (43 B.C.–17 A.D.) when he wrote that the arrows of Hercules were covered with the venoms of the Lerneian serpent.

Coming down to more recent times, Shakespeare, in "Romeo and Juliet," refers to poison and associates its illegal sale with a poverty-stricken apothecary, to the latter's discredit, in the following fashion:

Romeo: "I do remember an apothecary
And hereabout he dwells—which I late
noted
In tattered weeds, with overwhelming
brows,
Culling of simples; meagre were his looks,
Sharp misery had worn him to the bones;
.....Noting this penury, to myself I said—
And if a man did need a poison now,
Whose sale is present death in Mantua,
Here lives a caitiff wretch would sell it
him."

Being a holiday the apothecary's shop is closed, so Romeo calls to him and offers him 40 ducats for "A dram of poison."

The apothecary answers:

"Such mortal drugs I have; but Mantua's law
Is death to any he that utters them."

But, upon being importuned to make the sale he says:

"My poverty but not my will consents,"

And later:

"Put this in any liquid thing you will
and drink it off; and if you have the
strength
Of twenty men, it would despatch you
straight."

Poisons are mentioned several times in the Scriptures but in all cases in an allegorical sense.

Competent toxicologists have stated that an unqualified definition of a poison that will withstand critical examination is almost impossible. Many states have laws which attempt to define such an agent, and base the definition largely upon the dose required to produce deleterious or deadly effect. However, such definitions are not entirely satisfactory since most substances in small amounts do little or no harm, but may kill if taken in larger quantities. Thus it may be pointed out that, while small amounts of common salt must be included in the day's food, a quantity of 60 grams or more may be

harmful, and one four times as great may destroy the life of an adult. The question then as to what is or is not a poison depends upon the quantity taken into the body. Usually a poison is understood to be a substance which, administered in a small dose, is generally destructive of health or life. The general concept of a poison is necessarily relative. It must act through its own inherent chemical or other force, after absorption, not by any mechanical injury such as is induced by a lead bullet or by ground glass. Some authorities hold that there is no soluble substance that does not have poisonous effects if used in sufficiently large amounts. In this sense water may be a poison, and it has been demonstrated that water can be just that.¹

The antiquity of poisons and of a knowledge of such substances is indicated by the writings of Menes, the first historical King of Egypt, about 2300 B. C.; Susruta, the author of one of the Indian Vedas and whose period in history is variously given as from 800 B. C. to the second century A. D.; Apollodorus, 3rd century B. C.; Heracleides of Tarentum, 250 B. C.; Nicander of Colophon, 200–130 B. C.; Mithridates, King of Pontus, 124–64 B. C.; Heras of Cappadocia, first century B. C.; Zopyrus of Alexandria, about 90 B. C.; Aelius Promotus, first half of the first century, A. D.; Dioscorides, 40–90 A. D.; Attalus III Philometer, first King of Pergamus, who reigned in 138; also the following for whom no dates are assigned: Nicomedes of Bithnia, Theologus Morus, Marinus and Sextus Empiricus.

Some of these men cultivated poisonous plants and immunized themselves, and their friends did likewise, by taking small daily doses; some also prepared "antidotes" which were renowned for centuries not alone as antidotes to poisons but as medicines for all known diseases—veritable panaceas. They made very practical experiments with these agents, not on animals as would be done nowadays, but on criminals and, in some cases, on members of their own families.

Among poisons known to these men may be mentioned opium, mushrooms and other noxious plants, snake venom, mineral substances, poisonous animals, especially serpents, and one from peach kernels.

The early classification of poisons naturally was unscientific. Susruta recognized stable (plants and metals) and mobile (animal) poisons, and listed 8 roots, 5 leaves, 12 fruits, 5 flowers, 7 barks, juices and extracts; 3 lacticiferous plants, 13 bulbs, the ash of *Phenasma* and, last, yellow arsenic. He classified animal poisons as the glance (look, or "evil eye," as of a wild animal), breath, teeth, claws, urine, excreta, semen, bones and bile. Almost all genera of animals were included, but serpents were the most numerous.

Other writers mentioned aconite, conium, hyoscyamus, veratrum, hydrocyanic acid, opium, mandragora, colchicum, certain fungi (mushrooms),

¹ *J. Am. Med. Assoc.*, June 10, 1922, page 1840.

cantharides, copper oxide and sulfate, mercury as cinnabar, lead oxides, antimony (form not stated), some varieties of honey—possibly produced from the nectar of poisonous plants—beetles, toads, salamanders, the sea-hare, claterium, euphorbia and apocynum species, white and black veratrum, mezereum and menyanthes.

Legend has it that in India girls and women took increasing doses of poison (arsenic?) until they were so saturated with it that mere contact with them would cause one to lose all five senses and eventually die. They were known as "poison girls" (*puellae veneficae* or *puellae venenificae*). Susruta wrote about them as did Rhazes (10th century).

In early days poisons were used in the form of chopped, bruised or ground plants or plant parts, expressed juices or infusions or decoctions. The Egyptians are said to have known hydrocyanic acid which they obtained in dilute form by macerating peach kernels in water. A poisonous potion found its way from Egypt to Rome and, from the fact that those who swallowed it died almost immediately, it has been assumed to have depended upon hydrocyanic acid for its toxicity.

Capital punishment was inflicted by the sword or by hanging until a little before the beginning of the Christian era, when poison was introduced as an official means of execution. It was employed by the Greeks, and it may have served to popularize the use of toxic agents for the purpose of committing suicide. Those who objected to disfigurement by falling upon a sword or of effecting the same end by other mechanical means, or whose courage failed them at the critical moment, resorted to the poison cup which, in many cases, caused a painless death. In the East and in parts of Europe, suicide was not then regarded as it is by us now, but rather as something desirable, and in some places received official blessing. It is stated that the public officials of Marseilles and Massilia dispensed a potion containing cicuta (conium) to any and sundry who could convince the former that death was desired or desirable. Some of the "reasons" that were accepted as good and sufficient were very flimsy. Opium appears to have been employed in many such cases.

In India poisons were secretly administered for purposes of robbery and revenge, and in many cases they were given to some member of the family. Here, especially, secret assassinations by means of poisons became so numerous that to discourage the practice within the family circle, the Hindoo widow was required to sacrifice herself upon her spouse's funeral pyre.

In view of the more or less general apathetic attitude toward suicide and to the official execution of criminals by poisonings, it is not surprising that so-called criminal schools for the training of professional poisoners, men and women, developed their art and conducted secret assassinations on a business basis, quite in the open, from the 15th to the 17th century, especially in the Republic of Venice and in Italy. For a suitable consideration, these poisoners could be

employed by anyone in high or lowly estate to remove some unwanted individual. So many public officials and others were removed during the Middle Ages by means of poisons smuggled into their food or drink, that court "tasters" were installed to taste of every dish before it was presented to the person in high office. The thought was that if the food contained any noxious substance, the effects would be noted by the taster and the more important personage saved. Tableware of "Electron" was used because it was held that such ware would tarnish upon contact with poison. Venetian glassware was used for the same purpose as it was claimed that it would shatter when filled with poisoned wine.

Charles IX of France had an abiding faith in the ability of a piece of unicorn's horn to reveal the presence of poison in wine, and he had a member of his household dip a piece of it into his wine before it was served to him. The idea was, although it had never been tested, that the horn would change color in the presence of poison. The fact is that there never was such an animal as the unicorn.

On this same fictitious basis he believed that the bezoar stone would serve as an effective antidote if for some reason the test with the unicorn's horn had been omitted. Finally, at the suggestion of Ambroise Pare, the king's surgeon, the efficacy of the stone was put to test. A man who had been condemned to death for theft was given a dose of arsenic, and a half hour later, a bezoar stone. The poor fellow died in agony, and the stone lost its reputation as an infallible antidote.

In "Claudius the God," Graves, the author of the volume, has Claudius say: "I was still extremely popular with the Guards and took so many precautions against assassination—a constant escort of soldiers, careful searchings for weapons, a taster against poisons at every meal—and my household was so faithful and alert, that a man would have had to be extremely lucky as well as ingenious to take my life and escape with his own."²

In Italy, secret assassinations were instigated by high government and church officials or by the actual government itself. The deliberations of a "Council of Ten" preserved written records giving the reasons for desiring the death of one or another, the names of the membership voting aye or nay on the question, as well as the fee to be paid. This "Council of Ten" on Dec. 15, 1513, received an offer from a Franciscan brother, John Ragubo, to do away with objectionable personages, for a pension of 1500 ducats annually for his first successful accomplishment; for each subsequent poisoning he was to receive an additional stipend as per an accompanying schedule. The Council, in January 1514, accepted the "patriotic offer," and decided that the Emperor Maximilian should be the first victim.

The schedule of "prices" was as follows: for the successful assassination of the Great Sultan 500; King of Spain 150; Duke of Milan 60; Marquis of

² Robert Graves, "Claudius the God and His Wife, Messalina," 1935. Random House, Inc., New York.

Mantua 50; and the Pope 100 ducats. In addition, the incidental expenses of travel to and from the scene of action, and bribery of "friends" and servants of the intended victim, were to be defrayed. The concluding statement was: "The farther the journey, the more prominent the men, the more it is necessary to reward the toil and hardship undertaken, and the heavier must be the payment." (Blyth.)

A notorious French poisoner was Marie Marguerite Marquise de Brinvilliers, born about 1630. Her paramour, Godin de Sainte-Croix, while in prison, may have learned about poisons and their preparation from a certain Exili or Eggidi, a noted Italian poisoner. The former conveyed the information so obtained to his mistress who then killed her father, two brothers and a sister in the hope of inheriting their property.

It appears that this woman maintained an elegant, demure and modest exterior which concealed a diabolical nature. She visited hospitals, comforted the sick and supplied them with sweetmeats and dainties which she had poisoned. This enabled her to watch the effects and thus to extend her practical knowledge of the action of these agents.

There was much speculation as to the identity of the poison this woman and her mentor, St. Croix, employed. An apothecary, Guy Simon, was engaged to determine its composition. At his time, chemical analysis was barely in its formative stage, and Simon was not able to accomplish the task he had undertaken as is clear from his statement that—"It is a terrible, diabolic, intangible poison."

Along with a number of her associates in her nefarious undertakings she was condemned to be burned. According to some historians she paid the supreme penalty while others, who were more nearly her contemporaries, hold that she evaded execution.

Exili or Eggidi, previously referred to, is said to have assisted a Madame Olympia, Queen of Rome under Innocent X, to poison many people (150) that she might inherit their property. He is believed to have instructed others in the fine art of poisoning.

A Sicilian woman named Tofana or Toffana had a solution known as *Acqua Toffana*, *Acquetta di Napoli*, also as *Acquetta di Perugia*, which she is said to have used frequently and effectively in Palermo and Naples. It was a solution of arsenic. She was finally arrested, tortured and probably executed in 1709.

It is stated that there were in Paris during the latter part of the 16th century, some 30,000 poisoners. Just how much of these stories of murders is fact and how much is fancy, may be another matter.

Catherine de Medici, born in Florence in 1519, a niece of Pope Clement VII, and the wife of Henry II, King of France, is accused of having poisoned a number of people, and to have been in large measure responsible for the St. Bartholomew's Day massacre.

During the reign of Claudius (10 B. C.—54 A. D.) a woman named Locusta was a prominent compounder and purveyor of poisons which she supplied

with directions for use. It was she who prepared, at the instance of the Empress Agrippina, the second wife of Claudius, and the mother of Nero, the poison that was used to kill Claudius. It was concealed in mushrooms. Nero later availed himself of her services to get rid of his tutor Burrhus, also of Britannicus and his sisters, the son and the daughters of Claudius.

Back in early times and still more so when the science of toxicology began to make headway, attempts were made to find effective toxic substances that would produce effects or symptoms simulating those of common diseases, in order to avoid suspicion. The development of chemistry, and toxicology in particular, made crude poisonings difficult and hazardous because of the possibility of detection. More subtle means of doing away with an enemy or rival had to be found. Among many novel devices that are said to have been employed were poisoned gloves, boots, shirts, wigs and other articles of wearing apparel; snuff, perfumes, tableware, needles, and even books, and letters.

Among the prominent personages who are known or believed to have been murdered by means of poisons are Socrates, 5th century B. C., condemned by the populace and killed by means of hemlock; Titus, Roman Emperor, 40–81; Otto III, Roman Emperor and King of Germany, 980–1002; Pope Alexander VI, a member of the Borgia family, 1431–1503, died from poison he had intended for a cardinal; Pope Clement VII, 1480?–1534, passed away by inhaling the vapors of poisoned candles; Henry VII, killed by poison concealed in a communion wafer; Konrad, King of Naples, was murdered by means of a clyster administered by his brother Manfred. In addition to the last three, Lewin states that the Republic of Venice employed poisons to do away with Charles VIII, Ludwig XII, two emperors, three sultans, many dukes, cardinals and bishops, all for political reasons. The German Emperor Otto III was done away with by Stephania, the widow of the Roman governor, John Crescentius, through the agency of arsenic-poisoned gloves. Camilla, a girl to whom Claudius was betrothed, was poisoned by the latter's grandmother, Livia. LaWall adds the following names to the list: Pope Victor II, Christopher of Denmark, King John of Castile and Henry IV of France.

As indicated in the quotation from Shakespeare, laws were passed in many countries, and ordinances in many cities, intended to control the unbridled sale of poisons. However, in spite of these regulatory measures, there always were some who could supply the deadly materials for a consideration. Some statutes prescribed the death penalty for violations. In England, at one time, a strong feeling of resentment developed toward cowardly poisonings, largely because of a number of deaths that occurred in the household of the Bishop of Rochester, which were believed to have resulted from poisoning. An Act therefore was passed during the reign of Henry VIII which set up not alone the death penalty, but re-

quired that the guilty person be boiled in oil. Wriothley's Chronicle of 1542 cites a case in which this penalty was imposed, in the following words:

"This yeare, the 17th of March, was boyled in Smithfield ane Margaret Davie, a mayden, which had pouysoned 3 householdes that she dwelled in. One being her mistress, which dyed of the same, and one Darington and his wyfe, which she also dwelled with in Coleman Street, which dyed of the same, and also one Tinleys, which dyed also of the same."

Later on, although the death penalty was retained, the form of execution was changed to hanging. In 1598 two men who had been accused of concealing poison in Queen Elizabeth's saddle were hanged.

Undoubtedly many of the stories that have been told and retold and some of which are repeated here are fantastic especially in regard to the number of persons poisoned by one individual; nevertheless they probably represent but a small proportion of the numbers of people who have come to an untimely end by murderous poisons since many deaths never were suspected to be due to other than natural causes. We need not excite ourselves unduly over the official executions by poison since they may not have been less merciful than other forms of capital punishment then in vogue. Execution by burning, stoning, quartering; slow torture by the application of hot irons, pouring hot oil or molten lead into wounds; gouging out eyes, cutting off hands, arms or legs, or confinement in cages with wild animals certainly were not civilized means of ridding society of even desperate and malicious criminals. In recent years, and in the most enlightened and humane country in the world, execution of capital offenders has been accomplished by means of lethal gas. There has been decided opposition to this form of punishment, but there are always people who oppose the "Eye for an eye" dictum regardless of the heinousness of the crime that has been perpetrated.

In the World War mass murder was accomplished by the several combatants by the diffusion of irritant, corrosive, destructive poisonous gases. While the older peoples decimated their numbers on a small scale, modern nations in their "civilized" warfare carry on human destruction on an infinitely larger and more efficient scale.

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