"U.S.S Constitution — Old Ironsides," by Marshall Johnson
Artwork courtesy of United States Library of Congress

NOTES ON THE ETHNOBOTANY OF WARFARE

By Mark J. Plotkin, PhD

"The problem with history," the late ethnobotanist Richard E. Schultes, PhD, frequently used to say in his 'Plants and Human Affairs' course, "is that it is written by historians who often know little or nothing about botany or ethnobotany. Much of our history can and should be written in terms of plants and their effects on human affairs."

When asked the role of plants in their War of Independence, Americans typically cite the Boston Tea Party. On the evening of December 16, 1773, several dozen colonists, some dressed as Native Americans, boarded three British ships and pitched 342 chests of tea into Boston Harbor. The rebels' refusal to endure "taxation without representation" helped to set the American Revolution in motion.

But there exists a much more contributory ethnobotanical factor leading to the American Revolution, one that appears in relatively few history books.

Several hundred years ago, the British Royal Navy represented the most powerful naval force in the world, and played a key role in establishing and maintaining the global dominance of the British Empire. Prior to the advent of the airplane and air power in general, the country that patrolled the oceans controlled the world.

However, by the 18th century, the British Navy faced a clear and present danger — and not from another fighting force. Great sailing ships required tall masts and, in the age prior to the invention of composite materials, these masts were made from towering trees growing in primary forests. Old English oaks (*Quercus robur*, Fagaceae) had proven excellent choices, but these botanical titans had long disappeared from the English landscape. The British were increasingly reliant on tall trees from Baltic forests, until they found something bigger and better: 230-foot white pines (*Pinus strobus*, Pinaceae) from New England. Now, it seemed, he who controlled the white pines might control the oceans — and the world.[1]

Hence, the English chose to claim these trees for the British Crown, and sent representatives to the colonies to carve the King's Insignia — the "Broad Arrow" — on the giant pines and other species suitable for the Royal

White Pine *Pinus strobus.* Photo ©2014 Steven Foster

Of course, the martial capabilities of ancient armies were dependent on another range of plant products: medicines.

Navy. Understanding the value of this botanical treasure, the Colonists became the Rebels. They would build their own navy and, ultimately, their own empire.[2] The US Navy's oldest fighting frigate, the U.S.S. Constitution — better known as "Old Ironsides" and still berthed at Boston Harbor — was constructed in the 1790s with masts of New England white pine. In fact, Harvard historian R.G. Albion, in his classic book *Forests and Sea Power* (1999) concluded that inferior masts undercut the effectiveness of the Royal Navy during the American War for Independence.[3]

The use and abuse of forests has been deeply entwined with the rise and fall of empires, long before the American hegemony appeared on the scene. Both the Greek and Roman Empires were built on — and of — wood. While modern people generally associate the great buildings of ancient Athens and Rome with marble, most structures were constructed of wood. Even the Parthenon itself — and the famous giant statue of the goddess Athena by Phidias inside — required enormous amounts of weight-bearing timbers.[4] Also carved from wood were Greek and Roman weapons (including spears, shields, bows, arrows, and catapults) and means of transportation (carts and chariots, as well as merchant vessels and warships). Moreover, Rome at its height harbored a population between 800,000 and one million people, and meals for these citizens were cooked over wood fires. This is in addition to all the lumber that was burned to fire their ceramics, to extract precious metals, and to heat their ubiquitous Roman baths.[5]

The vaunted Roman Army could no more fight or travel — or even eat — without wood than the US military can conduct any of these activities without petroleum. Twenty-five hundred years ago, Plato (428 – 348 BCE) in his *Critias* complained that, within his lifetime, the loss of timber had denuded the hills and plains surrounding Athens and caused massive soil erosion[5]; today, both Greece and Italy remain largely deforested. The fall of the Roman Empire has been attributed to many factors — from the barbarian invasions, to the collapse of social and economic institutions, to lead in the drinking water — but it was the wanton destruction of their woodlands that seriously undercut the fighting forces of both empires.

Of course, the martial capabilities of ancient armies were dependent on another range of plant products: medicines. An army that cannot heal its wounded soldiers and send at least some back to battle faces serious limitations as an effective fighting force.

The Romans were ethnobotanical opportunists, instructing their physicians to query the local tribes about the healing properties of local plants, thereby enriching the Imperial pharmacopeia. Indeed, the most famous natural historian of the ancient world was Pliny the Elder (CE 23 – 79), who served in the Imperial military. In one instance the Roman troops were fighting in what is now the Netherlands, and the men became increasingly incapacitated by scurvy, which is characterized by malaise and lethargy. An allied local tribe, the Frisians, informed Pliny that this disease could be cured by consuming a local dock (*Rumex crispus*, Polygonaceae), which is now known to be relatively rich in vitamin C.[6] The Romans recovered and fought on.[7] Notably, the British Royal Navy discovered a remedy for scurvy only in the 1700s, at which point their sailors became known as "limeys" due to their regular consumption of citrus.

The history and legends of the ancient Mediterranean brim with tales of plants that that harm as well as heal. The ancient Greek word for poison, *toxicon*, is derived

"The Education of Achilles," by James Barry
Artwork courtesy of Yale Center for British Art

Yarrow *Achillea millefolium.* Photo ©2014 Steven Foster

from the ancient Greek word for arrow, *toxon*.[8] The legendary Hercules was said to have employed arrows with tips poisoned with the blood of the deadly Lernean Hydra. But the Hydra was first summoned from its lair when the Greeks shot flaming arrows tipped with plant-derived pitch, which suggests that the ancient Hellenes employed both plant and animal products to enhance the efficiency of their weapons. In another tale fraught with metaphor, the centaur Chiron — who in myth not only served as Hercules' teacher, but taught medicine to humans — was killed by an errant, Hydra-blood-tipped arrow, shot by Hercules at other centaurs who were drunk and disorderly.[9]

Chiron also trained other mythological figures important to the ancient Greeks, including Achilles, Asclepias, and Jason. All of these were botanically immortalized by the plants named after them; Chiron being commemorated in no less than seven genera: *Centaurea, Centaurium, Centaurodendron, Centauropsis, Centaurothamnus, Centauroserratula*, and *Chironia*. Asclepius gave his name to milkweeds (*Asclepias* spp., Asclepiadaceae), while Jason is commemorated in the genus *Jasonia* (Asteraceae). Achilles is memorialized as the genus *Achillea* (Asteraceae), the much-valued yarrow, used in the ancient world for stanching blood flow from wounds.[8,10]

An overlooked figure in ethnobotany, Aristotle (348 – 322 BCE), is today most widely celebrated for his philosophical teachings. As the greatest polymath of his time, however, he almost certainly learned medicinal plants from his father, who served as court physician to the King of

Macedon. Aristotle undoubtedly conveyed these teachings to his most famous pupil, Alexander the Great (356 – 323 BCE). Like any outstanding general, Alexander had to be concerned with the welfare of his troops, particularly any compound that could heal wounded warriors therefore permitting them to fight another day. Legend has it that Alexander captured the island of Socotra, midway between Somalia and Yemen, to guarantee access to healing aloes (*Aloe* spp., Xanthorrhoeaceae) found on the island[11] (though disregarded as authentic by modern historians). More likely, any ethnomedical interest in Socotra by Alexander or any other warriors was linked with the presence of myrrh and frankincense, medicines of major import in the ancient world.

The Iliad represents one of the best accounts of battle injuries in ancient warfare: There were 147 different wounds detailed in Homer's epic poem.[8] Medical historian Mirko Grmek wrote: "the author of the *Iliad* describes with remarkable anatomical precision, and not without some delight, a great number of highly varied wounds visited upon the warriors fighting before the walls of Troy. In some ways these descriptions constitute the oldest surgical report of losses in a military campaign."[12]

Opium

While the author of *The Iliad* provided detailed accounts of combat wounds, less specificity was granted to the treatments, though both plants and charms are mentioned. At that stage of human history, one battlefield standard was opium, the narcotic alkaloid-containing latex from the opium poppy (*Papaver somniferum*, Papaveraceae).[13] In fact, opium represents the most important plant employed for wound treatment from prehistory to the present day, being the source of the prescription analgesics codeine and morphine.

Medicinal use of opium arose as early as the Neolithic period. A famous Cretan terracotta statue with three opium capsules growing out of a hat now serves as the symbol of the *Journal of Ethnopharmacology*. The first documented cultivation of these poppies took place in the Fertile Crescent by the Sumerians in ca. 3400 BCE. The earliest mention of medical use of opium dates back to the reign of Assurbanipal (668 – 627 BCE). It was employed widely in Sumerian, Egyptian, Greek, Roman, Indian, Persian, and Arab medicine. The earliest discovery of opium prepared as a medicine was in the tomb of the Egyptian royal architect Cha from the 15th century BCE.[13]

Opium was used for many purposes in ancient Egypt — it is repeatedly recommended in the Ebers Papyrus from 1550 BCE.[14] Two essential uses would have been for pain relief and as a soporific. Both the Greek physician Dioscorides (ca. CE 40 – 90) and the Roman naturalist Theophrastus (371 – 287 BCE) recommended opium for these purposes.[8] In fact, Dioscorides was a military physician in Nero's army and collected information on healing plants during his travels. His book, *De Materia Medica*, served as a standard ethnomedical reference for up to 15 centuries.

A famous passage in Homer's *Odyssey* refers to *nepenthe*, the drug that induces forgetfulness: "Helen, daughter of Zeus, poured a drug, nepenthe, into the wine they were drinking which made them forget all evil." While some have posited that this refers to absinthe (*Artemisia absinthium*, Asteraceae), hashish, or some other cannabis derivative (from *Cannabis sativa*, Cannabaceae), opium is the most compelling candidate.[13] With respect to the need to "forget": Could this be an ancient prescription for the treatment of post-traumatic stress disorder?

Wine

While opium is widely known as an important drug of ancient times, wine is seldom regarded as a therapeutic compound even though its use dates back to the first-recorded history. Like the opium poppy, the wine grape (*Vitis vinifera*, Vitaceae) was first appreciated by the human

Opium *Papaver somniferum*. Photo ©2014 Steven Foster

Myrrh *Commiphora myrrha.* Photo ©2014 Steven Foster

species in Neolithic times. Winemaking has been documented as early as 7000 BCE in the Georgian Caucasus and shortly thereafter in Persia and Armenia. Wine was an important item of trade in the ancient Mediterranean region: From Phoenician shipwrecks to the tomb of King Tut (1341 – 1323 BCE), there is ample evidence that wine was produced, bought, and sold throughout the ancient world.[15]

Two important practical uses for wine in ancient times bear mentioning. Wine and other fermented beverages often were safer to drink than water.[15] This would have been exceedingly important for armies on the march. Soldiers of the day were unlikely to know which sources of water were clean and potable, and large groups living in cramped quarters would be prone to pollute local streams, ponds, or small rivers. Wine also served as an important menstruum: a liquid in which other plant materials could be dissolved and consumed. Opium and other botanicals were often administered in this form, with the alcohol serving as a solvent that would extract chemicals from the plants.

Wine itself was medicinal: certainly as a soporific, somewhat as an anesthetic, and — perhaps most important of all — as an antimicrobial. Wine as a medicine appeared in a Sumerian pharmacopeia, was recommended for medical use in the Kahun, the Edwin Smith, and the Ebers papyri, and is cited in both the Old and New Testaments. It was hailed for its therapeutic properties by Greek physicians Hippocrates (460 – 370 BCE) and Dioscorides (ca. CE 40 – 90) , Roman physicians Pliny the Elder (CE 23 – 79) and Galen (CE 129 – ca 208), and the Arab physician Rhazes (CE 865 – 925).[8]

An Austrian military doctor, Alois Pick, published the first scientific proof of the antiseptic properties of wine in 1892. During a cholera epidemic in Paris, wine drinkers largely escaped the deadly disease. Pick mixed cholera and typhoid bacilli with wine, and found that the disease-causing agents died off, leading to a host of subsequent experiments yielding similar results. In the words of Guido Majno, PhD:

> The antiseptic power of wine is no myth. Since it cannot depend on alcohol alone … (recent research has pinned) down the mechanism to the anthocyanes, a subgroup in the large group of polyphenols present in wine. The most important member of this group of compounds, as regards antibacterial effects, is also the principal pigment of red wines, malvoside or oenoside; there is a colorless equivalent for white wines. This pigment is already present in grapes, but combined with a carbohydrate and not antiseptic; during alcoholic fermentation it splits free and becomes activated.[8]

Myrrh

Today, myrrh, the dried resin of several species of small thorny trees of the genus *Commiphora*, represents what is perhaps the most misunderstood medicinal plant of ancient times. There are seven references to myrrh in the Song of Solomon, and, in Proverbs, the harlot's bed is sprinkled with "myrrh, aloes, and cinnamon."[16] The most famous reference to myrrh in the Bible is the gift of the Magi in Matthew 2:10: "Then they opened their treasure chests and gave him gifts of gold, frankincense, and myrrh."

Myrrh is widely regarded as merely an incense: In Monty Python's satirical film "The Life of Brian," the false messiah's mother tells the departing wise men: "Thanks a lot for the gold and frankincense, but don't worry too much about the myrrh next time!"

So valuable was myrrh as a perfume, incense, and medicine that it could be worth its weight in gold. So prized a trade item was it in the ancient world that a primary area of production — the southwestern corner of the Arabian Peninsula — was known as "Arabia Felix" ("Fortunate Arabia").

The first documented ethnobotanical expedition was dispatched in search of myrrh. Queen Hatshepsut, the

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famous female pharaoh, sent an expedition south to the Land of Punt (Somalia) in 1495 BCE. The Egyptian bioprospectors returned home with 31 myrrh trees, the roots carefully packed in and protected by baskets on the voyage home. These were planted at the temple of Amon at Thebes. Scenes from the expedition — including the boat being loaded with the trees — are depicted on Hatshepsut's tomb at Deir el-Bahri.[17]

Certainly the Pharaoh Hatshepsut would not spend considerable time and resources to import mere incense. Just over a century after her expedition, Pharaoh Amenophis IV received a letter from his Lieutenant Mikili, who was then fighting in Palestine. The letter closed as follows: "And let the King, my Lord, send troops to his servants, and let the King, my lord, send myrrh for medicine."[8]

Myrrh was employed by ancient healers in ancient Egypt, Greece, Rome, and Persia to dress wounds — in fact, it is one of the most commonly prescribed wound dressings in Hippocrates' writings, and Dioscorides highlighted it as well.[18] In the medical papyri of ancient Egypt, 63 of 66 mentions of myrrh are for external uses; numerous myrrh plasters are described in the Ebers Papyrus. More recent experiments have shown that myrrh (and the related fragrant and medicinal gum frankincense, from the genus *Boswellia* [Burseraceae]) are antifungal, anti-parasitic, and anti-inflammatory.[8] Additionally, myrrh has analgesic effects, which helps to explain why it was offered to Christ during the crucifixion: "And they tried to give Him wine mixed with myrrh; but He did not take it" (Mark 15:23).[16]

Inspired by ancient accounts of myrrh's healing efficacy, Dr. Majno tested the resin in the laboratory and found it extremely effective at killing the deadly *Staphylococcus aureus*, a typical wound bacterium.[8]

Popular history gives the impression that Alexander Fleming "invented" penicillin in 1929. Of course, Fleming did not invent a natural product: rather, he found and extracted penicillin from the *Penicillium* fungus he found growing on his petri dish in St. Mary's Hospital in London. And the search for antibacterial agents long predates Fleming's discovery.[19]

Queen Hatshepsut
Photo ©2014 Rob Koopman

While studying the 1,500-year-old bones of ancient Nubians, anthropologist George Armelagos exposed them to ultraviolet light and was stunned to witness the appearance of fluorescent yellow-green bands, an indication of the presence of the antibiotic tetracycline — an antibiotic that supposedly wasn't discovered until 1948. Further research led Armelagos and his colleagues to conclude that the ancient Africans knowingly had made and ingested a beer they prepared from grain contaminated by *Streptomycetes*, the genus of bacteria that produces numerous antibiotics, and that they used this beer to treat both gum disease and wounds.[20]

Furthermore, there is evidence that antibiotic fungi for the treatment of wounds may have been discovered — and forgotten — on other occasions prior to Fleming.[7] The Ebers Papyrus from 1550 BCE recommended: "if the wound rots too much, then bind on it spoiled barley-bread…."[8] The great Louis Pasteur, originator of the Germ Theory of Disease, observed that some bacteria seemed to have the ability to kill others, but he never developed

this further.[17] And there are persistent stories of British midwifes having used moldy bread to treat postpartum infections, but never being taken seriously by the medical establishment prior to Fleming's discovery.[21]

Infections always have been part of warfare. However, the advent of mechanized warfare with weapons like the Gatling gun, the greatly magnified ability to inflict wounds, and the need for anti-infectives grew accordingly. Beginning in the latter part of the 19th century, combatants in battles of the US War Between the States (the "Civil War") and then World War I died more often of their infections than their actual wounds. Fleming's horrific experiences as a field surgeon on the Western Front in France during World War I were undoubtedly a driving inspiration to develop penicillin into a cure for war wounds and other infectious afflictions.[22]

That antibacterials would play a key factor in winning battles in the age of mechanized warfare was widely realized at the time. Antibiotics are typically associated with living organisms like the *Penicillium* fungus that provides penicillin, or the *Streptomycetes* that have yielded streptomycin and tetracycline. The first commercially available antibiotic was Prontosil, developed from a synthetic dye by the German chemist Gerhard Domagk.[21] In one of history's great ironies, the life of Winston Churchill was saved by these German-developed sulfa drugs when he contracted pneumonia in the early years of World War II before penicillin was widely available.[23]

Meanwhile, the Communist world was taking a different tack to treating infection. George Eliava, a Georgian, was convinced that the most effective way to treat pathogenic bacterial infections was bacteriophages, viruses that devoured bacteria. Eliava — with the support of Joseph Stalin, himself a Georgian — built an institute in Tbilisi to develop phage therapy. Though Eliava was denounced as an "enemy of the people" and murdered in 1937 in one of Stalin's purges, the institute survived and phage therapy became a mainstay of Soviet medicine in World War II, with successful phage treatments for dysentery, gangrene, and other battlefield afflictions.[19] Despite some lean years after the fall of the Berlin Wall when Georgia declined to join the Russian Federation, the Eliava Institute continued to research and develop phage therapy. In a world where hundreds of thousands of people die every year from drug-resistant bacterial infections, it is not impossible to believe that phage therapy may one day be used to treat the wounds of war and many other bacterial ailments that continue to afflict humankind.

Paradoxically, a predominant source of drug-resistant bacterial infections in the modern world is the hospital, an institution first devised by the ancient Roman army. Known as *valetudinaria*, these hospitals were part and parcel of Roman encampments, typically built along the frontier in places like Palestine or Scotland, or along the Danube and the Rhine rivers. Defending a frontier from often-hostile tribes meant there presumably would be a constant supply of wounded soldiers in need of treatment, hence the creation of the houses of healing. That these hospitals were not — unlike modern hospitals — airtight and saturated with antibiotics, means that they were not a breeding ground for drug-resistant bacteria. Archaeological excavations of a *valetudinarium* at Novaesium (now Neuss, Germany, across the Rhine from Dusseldorf) revealed that the ancient hospital made ample use of two plant medicines: henbane (*Hyoscyamus niger*, Solanaceae), presumably employed as a sedative but toxic in large doses, and centaury (*Centaurium erythraea*, Gentianaceae), much valued as a healer of wounds.

The Swiss alchemist and physician Philippus Aureolus Theophrastus Bombastus von Hohenheim, better known as Paracelsus (1493-1541), memorably said "the dose makes the poison"— meaning that a substance in small doses might heal that in large doses would kill. Henbane is a perfect example: As noted, the Romans used henbane in their hospitals as a sedative, but the ancient Gauls were said to employ it as an arrow poison.[9] Until the invention of the

Paracelsus, by Wenceslaus Hollar
Artwork courtesy of Wenceslaus Hollar Digital Collection

Hemlock *Conium maculatum*. Photo ©2014 Steven Foster

Perhaps the deadliest ancient arrow poison was that of the Scythians. These semi-nomadic tribespeople were regarded as the greatest horsemen and the most accurate archers of their day.

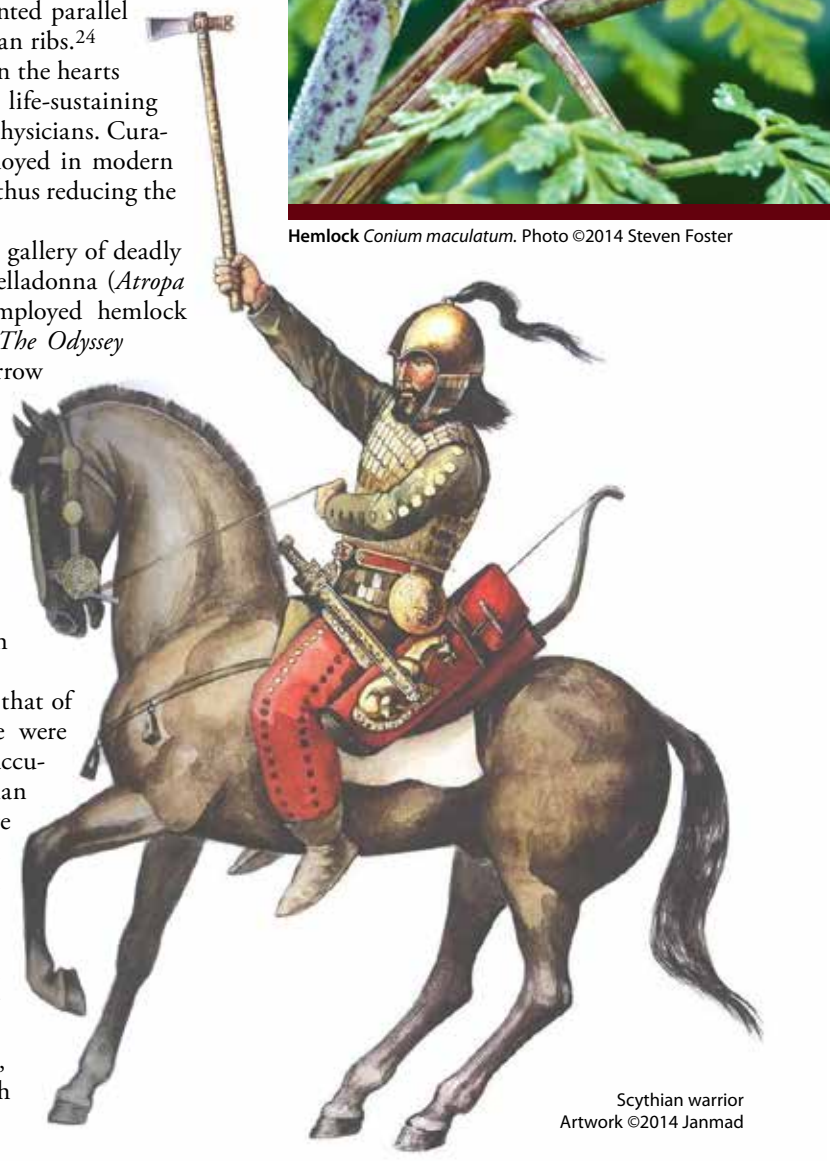
hypodermic needle and syringe, the arrow and the spear were the most effective means of injecting biological compounds into the mammalian bloodstream.

The most famous arrow poisons — the curares — are those of South American Indians. Species of the moonseed family (Menispermaceae; typically *Chondrodendron tomentosum*) predominate in the West, while species of the strychnos family (Loganiaceae; typically *Strychnos guianensis*) are more common in the East. These arrow poisons were used for both for hunting and for war. In the case of the Trio Indians of south Suriname, the only difference between arrows for hunting and arrows for war was that, in the latter case, the arrowheads were mounted parallel to the ground — so they could pass between human ribs.[24]

Ironically, the curare poison, which struck fear in the hearts of the Spanish Conquistadors, today serves as a life-sustaining medication in the hands of modern chemists and physicians. Curarizing compounds (e.g., d-tubocurarine) are employed in modern surgery to relax patients' skeletomuscular systems, thus reducing the amount of general anesthetic necessary.

War poisons of the ancient world were a rogues' gallery of deadly plants: The Nubians dipped their spear tips in belladonna (*Atropa belladonna*, Solanaceae), while the Scythians employed hemlock (*Conium maculatum*, Apiaceae) on their arrows. *The Odyssey* mentions Ulysses traveling to Epiros to collect arrow poison; some believe this was aconite (*Aconitum* spp., Ranunculaceae), which also was used in battle by the ancient Chinese and to hunt bears by the Ainu in Japan. Other lethal plant poisons smeared on war arrows were both the black hellebore (*Helleborus niger*, Ranunculaceae) and the white hellebore (*Veratrum album*, Liliaceae). One of these hellebores was employed by the Athenians and their allies to defeat the city of Kirrha through poisoning of the city's water supply.[9]

Perhaps the deadliest ancient arrow poison was that of the Scythians. These semi-nomadic tribespeople were regarded as the greatest horsemen and the most accurate archers of their day. Ranging across the Eurasian steppe from the Black Sea to Mongolia, they were renowned (and feared) for drinking the blood of their enemies from their adversaries' gilded skulls — and for using their scalps as napkins. The Scythians carried their deadly arrows in quivers made from human arms, at the end of which dangled the hands, still attached.[9,25] Many of their tombs have been unearthed during the past 75 years, yielding extraordinary treasures, weapons, and frighteningly lifelike mummies, some of which are women in full battle dress.



Scythian warrior
Artwork ©2014 Janmad

According to Herodotus, the first step in preparing the feared Scythian arrow poison was killing poisonous snakes and allowing the bodies to spoil. Then, animal dung was mixed with human blood and buried. Once this vile mixture was sufficiently rotten, it was unearthed and mixed with the viper corpses and viper venom. Even a mild wound from this toxin reportedly could cause tetanus and/or gangrene.[9] Such a weapon in the hands of accomplished archers could prove decisive on the battlefield and provide a colossal psychological edge as well.

Poison arrows loomed large in the ancient world: Paris killed Achilles by shooting one into the Greek's vulnerable heel, while the famed archer Philoctetes wreaked vengeance by killing Paris with a toxic shaft. The great Ulysses was slain with a spear tipped with the poisonous spine of a stingray. Such a weapon was considered the stuff of legend until it was found in use by both the Suya and the Kamayura Indian tribes of the Brazilian Xingu in the past 50 years.

The days of wars being fought primarily with natural products — wooden ships, shields, arrows bows, catapults, curare, snake poison, and others — are long past. That some of these products — like curare and other poisons — have or may have future potential to aid our species is without question. One example will suffice.

Leishmaniasis is a disease caused by protozoans that are transmitted by sandflies. They attack the mucous membranes, causes hideous skin lesions, and can damage the spleen and liver. They also can infect the cartilage of the nose and cause it to disintegrate. The common treatment is repeated high-dose injections of the heavy metal antimony, which is painful and has dreadful side effects. How the antimony combats the parasite is incompletely understood, and, to make matters worse, the parasite is becoming resistant to this treatment. Leishmaniasis occurs in many parts of the Middle East, including Afghanistan and Iraq. It is so common near Jericho that British soldiers who were infected with it in the early part of the 20th century were said to have "Jericho buttons." And so many American soldiers were infected in the past decade that it is now known as the "Baghdad boil."

Leishmaniasis also is common in the Amazon jungle. In the northeastern Amazon, the Trio (also spelled Tirio and Tiriyo) Indians treat it safely and seemingly effectively with a paste made from three plants (author's ethnobotanical observations; plants not disclosed by Trios). How humbling would it be if soldiers carrying laser-guided weapons were cured of their battlefield ailments by the formulas of tribesmen carrying poison-tipped arrows?

Conclusion

The days of plant products serving as weapons and being a major factor in determining the outcome of battles on land and sea are long past. Even in the modern hyper-tech world, however, plants — and the knowledge of how to use them — can still play a role. Time and again, the modern world has assumed that plants and ethnobotanical knowledge are of little or no use to modern medicine. Nonetheless, in an age where leishmaniasis and drug-resistant bacteria threaten soldiers and laymen, plants and plant wisdom are dismissed at our peril. HG

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M 713 BOSTON TEA PARTY

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Boston Tea Party mural by Robert Reid, 1904, located at the Detroit Publishing Company. Photo courtesy of United States Library of Congress

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