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OPIUM - POPPY CULTIVATION, MORPHINE AND HEROIN MANUFACTURE

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First of all, it seems like the information about opium cultivation and preparation and other chemistry came from a 1993 Department of Justice publication that was sponsored by DEA.

That booklet is, I understand, out-of-print, and will not be reprinted. It is an amazing document because it essentially tells you all you really need to know about opium poppies, opium, and the basic procedures for extraction and conversion of morphine to heroin.

I can also tell you that a USDA scientist named Mary Acock, was involved in the larger project that produced the book. It's my opinion that, had any of those government dudes thought about it for more than a few minutes, they never would have published it in the first place. It is simply too full of "dangerous" information.

- **Jim Hogshire**

Opium is the name for the latex produced within the seed pods of the opium poppy, *Papaver somniferum*. The plant is believed to have evolved from a wild strain, *Papaver setigerum*, which grows in coastal areas of the Mediterranean Sea. Through centuries of cultivation and breeding for opium, the species *somniferum* evolved. Today, *P. somniferum* is the only species of *Papaver* used to produce opium. Opium contains morphine, codeine, noscapine, papaverine, and thebaine. All but thebaine are used clinically as analgesics to reduce pain without a loss of consciousness. Thebaine is without analgesic effect but is of great pharmaceutical value due to its use in the production of semisynthetic opioid morphine analogues such as oxycodone (Percodan), dihydromorphenone (Dilaudid), and hydrocodone (Vicodin).

The psychological effects of opium may have been known to the ancient Sumerians (circa 4,000 B.C.) whose symbol for poppy was hul, "joy" and gil, "plant". The plant was known in Europe at least 4,000 years ago as evidenced by fossil remains of poppy seed cake and poppy pods found in the Neolithic Swiss Lake Dwellings. Opium was probably consumed by the ancient Egyptians and was known to the Greeks as well. Our word opium is derived from the Greek. The poppy is also referred to in Homer's works the Iliad and the Odyssey (850 B.C.). Hippocrates (460-357 B.C.) prescribed drinking the juice of the white poppy mixed with the seed of nettle.

The opium poppy probably reached China about the fourth century A.D. through Arab traders who advocated its use for medicinal purposes. In Chinese literature, there are earlier references to its use. The noted Chinese surgeon Hua To of the Three Kingdoms (220-264 A.D.) used opium preparations and *Cannabis indica* for his patients to swallow before undergoing major surgery.

The beginning of widespread opium use in China is associated with the introduction of tobacco smoking in pipes by Dutch from Java in the 17th century. The Chinese mixed Indian opium with the tobacco, two products that were being traded by the Dutch. This practice was adopted throughout the region and predictably resulted in increased opium smoking, both with and without tobacco.

By the late-1700s the British East India Company controlled the prime Indian poppy growing regions and dominated the Asian opium trade. By 1800, they had a monopoly on opium; controlling supply and setting prices.

In 1805, the German pharmacist Friedrich W. SertYrner isolated and described the principal alkaloid and powerful active ingredient in opium. He named it morphiium after Morpheus, the Greek god of dreams. We know it today as morphine. This event was soon followed by the discovery of other alkaloids of opium: codeine in 1832 and papaverine in 1848. By the 1850s these pure alkaloids, rather than the earlier crude opium preparations, were being commonly prescribed for the relief of pain, cough, and diarrhea. This period also saw the invention and introduction of the hypodermic syringe.

By the late eighteenth century opium was being heavily used in China as a recreational drug. The Imperial court had banned its use and importation but large quantities were still being smuggled into China. In 1839 the Qing Emperor ordered his minister Lin Zexu to address the opium problem. Lin petitioned Queen Victoria for help but was ignored. In reaction, the emperor confiscated 20,000 barrels of opium and detained some foreign traders. The British retaliated by attacking the port city of Canton. Thus the First Opium War began. The Chinese were defeated and the Treaty of Nanjing

was signed in 1842. The British required that the opium trade be allowed to continue, that the Chinese pay a large settlement, and that the Chinese cede Hongkong to the British Empire. The Second Opium War began and ended in 1856 over western demands that opium markets be expanded. The Chinese were again defeated and opium importation to China was legalized.

In the United States during the 19th century, opium preparations and 'patent medicines' containing opium extract such as paregoric (camphorated tincture of opium) and laudanum (deodorized opium tincture) became widely available and quite popular. In the 1860s morphine was used extensively pre- and post-operatively as a painkiller for wounded soldiers during the Civil War. Civil War physicians frequently dispensed opiates. In 1866 the Secretary of War stated that during the war the Union Army was issued 10 million opium pills, over 2,840,000 ounces of other opiate preparations (such as laudanum or paregoric), and almost 30,000 ounces of morphine sulphate. The inevitable result was opium addiction, called the 'army disease' or the 'soldier's disease.' These opium and morphine addiction problems prompted a scientific search for potent but nonaddictive painkillers. In the 1870s, chemists synthesized a supposedly non-addictive, substitute for morphine by acetylating morphine. In 1898 the Bayer pharmaceutical company of Germany was the first to make available this new drug, 3,6-diacetylmorphine, in large quantities under the trademarked brand name Heroin. 3,6-diacetylmorphine is two to three times more potent than morphine. Most of the increase is due to its increased lipid solubility, which provides enhanced and rapid central nervous system penetration.

Heroin was initially used with much success as a superior cough suppressant for patients with (then incurable) tuberculosis. Tuberculosis patients continued to die, but without the tortuous coughing and pain. A second use of heroin was to combat morphine addiction - just as morphine was originally used to combat opium addiction. Soon after its introduction, however, Heroin was recognized as having narcotic and addictive properties far exceeding those of morphine.

In December 1914, the United States Congress passed the Harrison Narcotics Act which called for control of each phase of the preparation and distribution of medicinal opium, morphine, heroin, cocaine, and any new derivative that could be shown to have similar properties. It made illegal the possession of these controlled substances. The restrictions in the Harrison Act were most recently redefined by the Federal Controlled Substances Act of 1970. The Act lists as a Schedule II Controlled Substance opium and its derivatives and all parts of the *P. somniferum* plant except the seed.

The first period of large scale heroin smuggling into the United States since its prohibition occurred during the years 1967 through 1971. Turkish opium was processed into heroin in France and then smuggled into New York.

In the mid-1970s Mexican brown heroin appeared. It was sold at a lower price than European heroin and became readily available in the West and Midwest. By the mid-1980s the U.S. heroin market was being supplied from three regions: Mexico, Southwest Asia (Pakistan, Afghanistan, Turkey, Lebanon), and Southeast Asia (Burma, Laos, Thailand). Soon thereafter, South American heroin from Columbia appeared.

In 1997, Southeast Asia still accounts for well over half of the world's opium production. It is estimated that the region has the capacity to produce over 200 metric tons of heroin annually. Although much of it is consumed in Asia, thousands of kilograms of Southeast Asian heroin enter the United States each year.

The chemical structure of opiates is very similar to that of naturally produced compounds called endorphins and enkephalins. These compounds are derived from an amino acid pituitary hormone called beta-lipotropin which when released is cleaved to form met-enkephalin, gamma-endorphin, and beta-endorphin. Opiate molecules, due to their similar structure, engage many of the endorphins' nerve-receptor sites in the brain's pleasure centers and bring about similar analgesic effects. In the human body, a pain stimulus usually elicits an immediate protective reaction followed by the release of endorphins to relieve discomfort and reward the mental learning process. Opiates mimic high levels of endorphins to produce intense euphoria and a heightened state of well-being. Regular use results in increased tolerance and the need for greater quantities of the drug. Profound physical and psychological dependence results from regular use and rapid cessation brings about withdrawal sickness.

In addition to the pleasure/pain centers, there is also a concentration of opiate receptors in the respiratory center of the brain. Opiates have an inhibiting effect on these cells and in the case of an overdose, respiration can come to a complete halt. Opiates also inhibit sensitivity to the impulse to cough.

A third location for these receptors is in the brain's vomiting center. Opiate use causes nausea and vomiting. Tolerance for this effect is built up very quickly. Opiates affect the digestive system by inhibiting intestinal peristalsis. Long before they were used as painkillers, opiates were used to control diarrhea.

The opium poppy, *Papaver somniferum*, is an annual plant. From a very small round seed, it grows, flowers, and bears fruit (seed pods) only once. The entire growth cycle for most varieties of this plant takes about 120 days. The seeds of *P. somniferum* can be distinguished from other species by the appearance of a fine secondary fishnet reticulation within the spaces of the coarse reticulation found all over their surface. When compared with other *Papaver* species, *P. somniferum* plants will have their leaves arranged along the stem of the plant, rather than basal leaves, and the leaves and stem will be 'glabrous' (hairless). The tiny seeds germinate quickly, given warmth and sufficient moisture. Sprouts appear in fourteen to twenty-one days. In less than six weeks the young plant has grown four large leaves and resembles a small cabbage in appearance. The lobed, dentate leaves are glaucous green with a dull gray or blue tint.

Within sixty days, the plant will grow from one to two feet in height, with one primary, long, smooth stem. The upper portion of this stem is without leaves and is the 'peduncle'. One or more secondary stems, called 'tillers', may grow from the main stem of the plant. Single poppy plants in Southeast Asia often have one or more tillers.

As the plant grows tall, the main stem and each tiller terminates in a flower bud. During the development of the bud, the peduncle portion of the stem elongates and forms a distinctive 'hook' which causes the bud to be turned upside down. As the flower develops, the peduncle straightens and the buds point upward. A day or two after the buds first point upward, the two outer segments of the bud, called 'sepals,' fall away, exposing the flower petals.

Opium poppies generally flower after about ninety days of growth and continue to flower for two to three weeks. The exposed flower blossom is at first crushed and crinkled, but the petals soon expand and become smooth in the sun. Opium poppy flowers have four petals. The petals may be single or double and may be white, pink, reddish purple, crimson red, or variegated. The petals last for two to four days and then drop to reveal a small, round, green fruit which continues to develop. These fruits or pods (also called 'seedpods', 'capsules,' 'bulbs,' or 'poppy heads') are either oblate, elongated, or globular and mature to about the size of a chicken egg. The oblate-shaped pods are more common in Southeast Asia.

The main stem of a fully-matured *P. somniferum* plant can range between two to five feet in height. The green leaves are oblong, toothed and lobed and are between four to fifteen inches in diameter at maturity. The mature leaves have no commercial value except for use as animal fodder.

Only the pod portion of the plant can produce opium alkaloids. The skin of the poppy pod encloses the wall of the pod ovary. The ovary wall consists of an outer, middle, and inner layer. The plant's latex (opium) is produced within the ovary wall and drains into the middle layer through a system of vessels and tubes within the pod. The cells of the middle layer secrete more than 95 percent of the opium when the pod is scored and harvested.

Cultivators in Mainland Southeast Asia tap the opium from each pod while it remains on the plant. After the opium is scraped, the pods are cut from the stem and allowed to dry. Once dry, the pods are cut open and the seeds are removed and dried in the sun before storing for the following year's planting. An alternative method of collecting planting seeds is to collect them from intentionally unscored pods, because scoring may diminish the quality of the seeds. Aside from being used as planting seed, the poppy seeds may also be used in cooking and in the manufacture of paints and perfumes. Poppy seed oil is straw-yellow in color, odorless, and has a pleasant, almond-like taste. The opium poppy grows best in temperate, warm climates with low humidity. It requires only a moderate amount of water before and during the early stages of growth. In addition, it is a 'long day' photo-responsive plant. As such, it requires long days and short nights before it will develop flowers. The opium poppy plant can be grown in a variety of soils; clay, sandy loam, sandy, and sandy clay, but it responds best to sandy loam soil. This type of soil has good moisture-retentive and nutrient-retentive properties, is easily cultivated, and has a favorable structure for root development. Clay soil types are hard and difficult to pulverize into a good soil texture. The roots of a young poppy plant cannot readily penetrate clay soils, and growth is inhibited. Sandy soil, by contrast, does not retain sufficient water or nutrients for proper growth of the plant.

Excessive moisture or extremely arid conditions will adversely affect the poppy plant's growth and reduce the alkaloid content. Poppy plants can become waterlogged and die after a heavy rainfall in poorly drained soil. Heavy rainfall in the second and third months of growth can leach alkaloids from the plant and spoil the opium harvest. Dull, rainy, or cloudy weather during this critical growth period may reduce both the quantity and the quality of the alkaloid content.

Opium poppies were widely grown as an ornamental plant and for seeds in the United States until the possession of this plant was declared illegal in the Opium Poppy Control Act of 1942. New generations of plants from the self-sown seed of these original poppies can still be seen in many old ornamental gardens.

The major legal opium poppy growing areas in the world today are in government-regulated opium farms in India, Turkey and Tasmania, Australia. The major illegal growing areas are in the highlands of Mainland Southeast Asia, specifically Burma (Myanmar), Laos, and Thailand, as well as the adjacent areas of southern China and northwestern Vietnam. The area is known as the 'Golden Triangle'. In Southwest Asia, opium poppies are grown in Pakistan, Iran, and Afghanistan. Opium poppy is also grown in Lebanon, Guatemala, Colombia and Mexico.

The highlands of Mainland Southeast Asia, at elevations of 800 meters or more above sea level, are prime poppy growing areas. Generally speaking, these poppy-farming areas do not require irrigation, fertilizer, or insecticides for successful opium yields.

Most of the opium poppies of Southeast Asia are grown in Burma (Myanmar), specifically in the Wa and Kokang areas which are in the northeastern quadrant of the Shan State of Burma. Laos is the second-largest illicit opium-producing country in Southeast Asia and third-largest in the world.

In Laos, poppy is cultivated extensively in Houaphan and Xiangkhoang Provinces, as well as the six other northern provinces: Bokeo, Louangnamtha, Louangphabang, Oudomxai, Phongsali and Xaignabouli. Poppy is also grown in many of the remote, mountainous areas of northern Thailand, particularly in Chiang Mai, Chiang Rai, Mae Hong Son, Nan and Tak Provinces.

In China, opium poppies are cultivated by ethnic minority groups in the mountainous frontier regions of Yunnan Province,

particularly along the border area with Burma's Kachin and Shan States. Son La Province, situated between China and Laos, is a major opium poppy cultivation area in Vietnam, as are Lai Chau and Nghe An Provinces.

It is noteworthy that the dominant ethnic groups of Mainland Southeast Asia are not poppy cultivators. The Burmans and Shan of Burma, the Lao of Laos, the Thai of Thailand, the Han Chinese of Yunnan, China, and the Vietnamese of Vietnam are lowlanders and do not traditionally cultivate opium poppies. Rather, it is the ethnic minority highlander groups, such as the Wa, Pa-O, Palaung, Lahu, Lisu, Hmong, and Akha who grow poppies in the highlands of the countries of Southeast Asia.

A typical nuclear family of Mainland Southeast Asian highlanders ranges between five and ten persons, including two to five adults. An average household of poppy farmers can cultivate and harvest about one acre of opium poppy per year. Most of the better fields can support opium poppy cultivation for ten years or more without fertilization, irrigation, or insecticides, before the soil is depleted and new fields must be cleared. In choosing a field to grow opium poppy, soil quality and acidity are critical factors and experienced poppy farmers choose their fields carefully. In Southeast Asia, westerly orientations are typically preferred to optimize sun exposure. Most fields are on mountain slopes at elevations of 1,000 meters (3,000 feet) or more above sea level. Slope gradients of 20 degrees to 40 degrees are considered best for drainage of rain water.

In Mainland Southeast Asia, virgin land is prepared by cutting and piling all brush, vines and small trees in the field during March, at the end of the dry season. After allowing the brush to dry in the hot sun for several days, the field is set afire. This method, called 'slash-and burn' or 'swidden' agriculture, is commonly practiced by dry field farmers - both highland and lowland - throughout Mainland Southeast Asia in order to ready the land for a variety of field crops. The slash-and-burn method is also used to clear fields for poppy cultivation. Before the rainy season in April, the fields by the hundreds of thousands all over the region are set ablaze. A fog-like yellow haze hangs over the area for weeks, reducing visibility for hundreds of miles. In the mountains, the dense haze blocks out the sun and stings the eyes.

A typical highlander family will plant an area of two or three rai in opium poppy (2.53 rai is equivalent to one acre). In August or September, toward the end of the rainy season, highland farmers in Southeast Asia prepare fields selected for opium poppy planting. By this time, the ash resulting from the burn-off of the previous dry season has settled into the soil, providing additional nutrients, especially potash. The soil is turned with long-handled hoes after it is softened by the rains. The farmers then break up the large clumps of soil. Weeds and stones are tossed aside and the ground is leveled off.

Traditionally, most highland and upland farmers in Southeast Asia do not use fertilizer for any of their crops, including the opium poppy, but in recent years opium poppy farmers have started using both natural and chemical fertilizers to increase opium poppy yields. Chicken manure, human feces or the regions' abundant bat droppings are often mixed into the planting soil before the opium poppy seed is planted.

The planting must be completed by the end of October in order to take advantage of the region's 'long days' in November and December.

The opium poppy seed can be sown several ways: broadcast (tossed by hand); or fix-dropped by hand into shallow holes dug with a metal-tipped dibble stick. About one pound of opium poppy seed is needed to sow one acre of land. The seeds may be white, yellow, coffee-color, gray, black, or blue. Seed color is not related to the color of the flower petals. Beans, cabbages, cotton, parsley, spinach, squash and tobacco are crops typically planted with the opium poppy. These crops neither help nor hinder the cultivation of the opium poppy, but are planted for personal consumption or as a cash crop.

In the highlands of Southeast Asia, it is a common practice to plant maize and opium poppies in the same fields each year. The maize keeps down excessive weeds and provides feed for the farmer's pigs and ponies. It is grown from April to August. After harvesting the maize, and with the stalks still standing in the fields, the ground is weeded and pulverized. Just before the end of the rainy season, in successive sowings throughout September and October, the poppy seed is broadcast among the maize stalks. These stalks can protect young opium poppy plants from heavy rains.

The opium poppy plants form leaves in the first growth stage, called the 'cabbage' or 'lettuce' stage. After a month of growth, when the opium poppy is about a foot high, some of the plants are removed (called 'thinning') to allow the other plants more room to grow. The ideal spacing between plants is believed to be 20 to 40 centimeters, or about eight to twelve plants per square meter, although some researchers in northern Thailand have reported as many as 18 plants per square meter.

During the first two months, the opium poppies may be damaged or stunted by nature through the lack of adequate sunshine, excessive rainfall, insects, worms, hail storms, early frost, or trampling by animals. The third month of growth does not require as much care as the first two months. Three to four months after planting, from late December to early February, the opium poppies are in full bloom. Mature plants range between three to five feet in height. Most opium poppy varieties in Southeast Asia produce three to five mature pods per plant. A typical opium poppy field has 60,000 to 120,000 poppy plants per hectare, with a range of 120,000 to 275,000 opium-producing pods. The actual opium yield will depend largely on weather conditions and the precautions taken by individual farmers to safeguard the crop. The farmer and his family generally move into the field for the final two weeks, setting up a small field hut on the edge of the opium poppy field.

The scoring of the pods (also called 'lancing,' 'incising,' or 'tapping') begins about two weeks after the flower petals fall

from the pods. The farmer examines the pod and the tiny crown portion on the top of the pod very carefully before scoring.

The grayish-green pod will become a dark green color as it matures and it will swell in size. If the points of the pod's crown are standing straight out or are curved upward, the pod is ready to be scored. If the crown's points turn downward, the pod is not yet fully matured. Not all the plants in a field will be ready for scoring at the same time and each pod can be tapped more than once.

A set of three or four small blades of iron, glass, or glass splinters bound tightly together on a wooden handle is used to score two or three sides of the pod in a vertical direction. If the blades cut too deep into the wall of the pod, the opium will flow too quickly and will drip to the ground. If the incisions are too shallow, the flow will be too slow and the opium will harden in the pods. A depth of about one millimeter is desired for the incision.

Using a blade-tool designed to cut to that depth, scoring ideally starts in late afternoon so the white raw opium latex can ooze out and slowly coagulate on the surface of the pod overnight. If the scoring begins too early in the afternoon, the sun will cause the opium to coagulate over the incision and block the flow. Raw opium oxidizes, darkens and thickens in the cool night air. Early the next morning, the opium gum is scraped from the surface of the pods with a short-handled, flat, iron blade three to four inches wide.

Opium harvesters work their way backwards across the field scoring the lower, mature pods before the taller pods, in order to avoid brushing up against the sticky pods. The pods continue to produce opium for several days. Farmers will return to these plants - sometimes up to five or six times - to gather additional opium until the pod is totally depleted. The opium is collected in a container which hangs from the farmer's neck or waist.

The opium yield from a single pod varies greatly, ranging from 10 to 100 milligrams of opium per pod. The average yield per pod is about 80 milligrams. The dried opium weight yield per hectare of poppies ranges from eight to fifteen kilograms.

As the farmers gather the opium, they will commonly tag the larger or more productive pods with colored string or yarn. These pods will later be cut from their stems, cut open, dried in the sun and their seeds used for the following year's planting.

The wet opium gum collected from the pods contains a relatively high percentage of water and needs to be dried for several days. High-quality raw opium will be brown (rather than black) in color and will retain its sticky texture. Experienced opium traders can quickly determine if the opium has been adulterated with tree sap, sand, or other such materials. Raw opium in Burma, Laos and Thailand is usually sun-dried, weighed in a standard 1.6 kilogram quantity (called a 'viss' in Burma; a 'choi' in Laos and Thailand), wrapped in banana leaf or plastic and then stored until ready to sell, trade, or smoke. While opium smoking is common among most adult opium poppy farmers, heavy addiction is generally limited to the older, male farmers. The average yearly consumption of cooked opium per smoker is estimated to be 1.6 kilograms.

A typical opium poppy farmer household in Southeast Asia will collect 2 to 5 choi or viss (3 to 9 kilograms) of opium from a year's harvest of a one-acre field. That opium will be dried, wrapped and stacked on a shelf by February or March. If the opium has been properly dried, it can be stored indefinitely. Excessive moisture and heat can cause the opium to deteriorate but, once dried, opium is relatively stable. In fact, as opium dries and becomes less pliable, its value increases due to the decrease in water weight per kilogram.

Before opium is smoked, it is usually 'cooked'. Uncooked opium contains moisture, as well as soil, leaves, twigs, and other impurities which diminish the quality of the final product. The raw opium collected from the opium poppy pods is placed in an open cooking pot of boiling water where the sticky globs of opium alkaloids quickly dissolve. Soil, twigs, plant scrapings, etc., remain undissolved. The solution is then strained through cheesecloth to remove these impurities. The clear brown liquid that remains is opium in solution, sometimes called 'liquid opium'. This liquid is then re-heated over a low flame until the water is driven off into the air as steam leaving a thick dark brown paste. This paste is called 'prepared', 'cooked', or 'smoking' opium. It is dried in the sun until it has a putty-like consistency. The net weight of the cooked opium is generally only eighty percent that of the original raw opium. Thus, cooked opium is more pure than its original, raw form, and has a higher monetary value.

Cooked opium is suitable for smoking or eating by opium users. Traditionally there is only one group of opium poppy farmers, the Hmong, who prefer not to cook their opium before smoking. Most other ethnic groups, including Chinese opium addicts, prefer smoking cooked opium. If the opium is to be sold to traders for use in morphine or heroin laboratories, it is not necessary to cook it first. The laboratory operators generally use 55-gallon oil drums or huge cooking vats to dissolve the raw opium before beginning the morphine extraction process.

Raw or cooked opium contains more than thirty-five different alkaloids, including morphine, which accounts for approximately ten percent of the total raw opium weight. Heroin manufacturers must first extract the morphine from the opium before converting the morphine to heroin. The extraction is a simple process, requiring only a few chemicals and a supply of water. Since the morphine base is about one-tenth the weight and volume of raw opium, it is desirable to reduce the opium to morphine before transporting the product any great distance. Morphine is sometimes extracted from opium in small clandestine 'laboratories' which may be set up near the opium poppy fields.

The process of extracting morphine from opium involves dissolving opium in hot water, adding lime to precipitate the non-morphine alkaloids and then adding ammonium chloride to precipitate the morphine from the solution. An empty oil drum and some cooking pots are all that is needed.

The following is a step-by-step description of morphine extraction in a typical Southeast Asian laboratory:

1. An empty 55-gallon oil drum is placed on bricks about a foot above the ground and a fire is built under the drum. Thirty gallons of water are added to the drum and brought to a boil. Ten to fifteen kilograms of raw opium are added to the boiling water.
2. With stirring, the raw opium eventually dissolves in the boiling water, while soil, leaves, twigs, and other non-soluble materials float in the solution. Most of these materials are scooped out of the clear brown 'liquid opium' solution.
3. Slaked lime (calcium hydroxide), or more often a readily available chemical fertilizer with a high content of lime, is added to the solution. The lime converts the water insoluble morphine into the water soluble calcium morphenate. The other opium alkaloids do not react with the lime to form soluble calcium salts. Codeine is slightly water soluble and gets carried over with the calcium morphenate in the liquid. For the most part, the other alkaloids become part of the residual sediment 'sludge' that comes to rest on the bottom of the oil drum.
4. As the solution cools, and after the insolubles precipitate out, the morphine solution is scooped from the drum and poured through a filter of some kind. Burlap rice sacks are often used as filters. They are later squeezed in a press to remove most of the solution from the wet sacks. The solution is then poured into large cooking pots and re-heated, but not boiled.
5. Ammonium chloride is added to the heated calcium morphenate solution to adjust the alkalinity to a pH of 8 to 9, and the solution is then allowed to cool. Within one or two hours, the morphine base and the unextracted codeine base precipitate out of the solution and settle to the bottom of the cooking pot.
6. The solution is then poured off through cloth filters. Any solid morphine base chunks in the solution will remain on the cloth. The morphine base is removed from both the cooking pot and from the filter cloths, wrapped and squeezed in cloth, and then dried in the sun. When dry, the crude morphine base is a coffee-colored powder.
7. This 'crude' morphine base, commonly known by the Chinese term p'i-tzu throughout Southeast Asia, may be further purified by dissolving it in hydrochloric acid, adding activated charcoal, re-heating and re-filtering. The solution is filtered several more times, and the morphine (morphine hydrochloride) is then dried in the sun.
8. Morphine hydrochloride (still tainted with codeine hydrochloride) is usually formed into small brick-sized blocks in a press and wrapped in paper or cloth. The most common block size is 2 inches by 4 inches by 5 inches weighing about 1.3 kilograms (3 lbs). The bricks are then dried for transport to heroin processing laboratories.

Approximately 13 kilograms of opium, from one hectare of opium poppies, are needed to produce each morphine block of this size. The morphine blocks are bundled and packed for transport to heroin laboratories by human couriers or by pack animals. Pack mules are able to carry 100-kilogram payloads over 200 miles of rugged mountain trails in less than three weeks.

The conversion of morphine hydrochloride to heroin base is a relatively simple and inexpensive procedure. The necessary chemicals are readily available industrial chemicals. The equipment is very basic and quite portable. Heroin conversion laboratories are generally located in isolated, rural areas due to the telltale odors of the lab's chemicals. Acetic anhydride, in particular, is a key chemical with the easily identified very pungent odor of pickles.

Heroin synthesis is a two-step process which generally requires twelve to fourteen hours to complete. Heroin base is the intermediate product. Typically, morphine hydrochloride bricks are pulverized and the dried powder is then placed in an enamel or stainless steel rice cooking pot. The liquid acetic anhydride is then added. The pot lid is tied or clamped on, with a damp towel used for a gasket. The pot is carefully heated for about two hours, below boiling, at a constant temperature of 185 degrees Fahrenheit. It is never allowed to boil or to become so hot as to vent fumes. It is agitated by tilting and swirling until all of the morphine has dissolved. Acetic anhydride reacts with the morphine to form diacetylmorphine (heroin). This acetylation process will work either with morphine hydrochloride or p'i-tzu (crude morphine base).

When cooking is completed, the pot is cooled and opened. The morphine and the acetic anhydride have now become chemically bonded, creating an impure form of diacetylmorphine (heroin). Water is added at three times the volume of acetic anhydride and the mixture is stirred. Activated charcoal is added and mixed by stirring and the mixture is then filtered to remove colored impurities. Solids remaining on the filter are discarded. Sodium carbonate, used at 2.5 pounds per pound of morphine, is dissolved in hot water and added slowly to the liquid until effervescence stops. This precipitates the heroin base which is then filtered and dried by heating in a steam bath for an hour. For each pound of morphine, about 11 ounces of crude heroin base is formed. The heroin base may be dried, packed and transported to a heroin refining laboratory or it may be purified further and/or converted to heroin hydrochloride, a water-soluble salt form of heroin, at the same site.

Southeast Asian heroin base is an intermediate product which can be further converted to either a smoking form (Heroin No. 3) or an injectable form (Heroin No. 4).

(Smoking Heroin, heroin hydrochloride)

To make heroin No. 3, the crude base is mixed with hydrochloric acid resulting in heroin hydrochloride. Adulterants including caffeine are added after this conversion. For each kilogram of crude heroin base about one kilogram of caffeine is used. Various 'flavorings' such as quinine hydrochloride or strychnine hydrochloride may be added in 7 gram or 14 gram increments. Next, the wet paste mix is stirred to dryness over the steam bath. The resulting dry Heroin No. 3 will be in the form of coarse lumps. These are crushed and passed through a #8 to #10 mesh sieve, and the grains (pieces) are then packaged for sale. The entire process takes about eight hours and requires only minimal skill. While extra attention to stirring is required to assure dryness, one man can prepare a one-kilogram block of Heroin No. 3 during this time.

(Injectable Heroin)

To the heroin base mixture in the pot, water is added at three times the volume of acetic anhydride and mixed by stirring. A small amount of chloroform is added. The mixture is stirred and then allowed to stand for twenty minutes. Doing so precipitates highly-colored impurities and a red, greasy liquid. The water layer is carefully poured off and saved in a clean pot, leaving the red grease in the pot. In a clean pot, activated charcoal is stirred into the aqueous solution and is filtered to remove solid impurities. The decolorizing effects of the charcoal, combined with the chloroform treatment, will leave a light yellow solution. The use of charcoal is repeated one or more times, until the solution is colorless.

Approximately 1.1 kilograms of sodium carbonate per 0.5 kilogram of morphine is dissolved in hot water and added slowly to the mixture until the effervescence stops. This precipitates the heroin base which is then filtered and dried by heating on a steam bath. The heroin base is heated until dryness is complete, an imperative for the preparation of Heroin No.4. The powder should be very white at this stage. If not white, the base is redissolved in diluted acid, treated repeatedly with activated charcoal, reprecipitated and dried. The ultimate purity and color of the resulting heroin hydrochloride depends largely on the quality of the heroin base.

The following optional steps are sometimes taken by skilled heroin chemists to increase quality.

For each pound of heroin base 1,100 milliliters of ethyl alcohol is heated to boiling. The heroin base is added and stirred until completely dissolved. The heated solution is then quickly filtered through a Büchner funnel that has been preheated and poured into a heated flask. This hot filtration removes the traces of sodium carbonate that remained in the base. The solution is quickly cooled in an ice bath, where it becomes very thick; like ice cream. The substance is put into a pan and set in a large refrigerator. A fan is set to blow across the pan to cause slow evaporation of the alcohol while the paste crystallizes. After several hours, it is vacuum-filtered. The filtrate, pure ethyl alcohol, is re-used. The solid material, 'alcohol morphine base', is actually recrystallized heroin base.

The heroin product, either heroin base or recrystallized heroin base, is weighed. For each pound of solid product, 3,000 milliliters of ethyl alcohol, 3,000 milliliters of ether, and 102 milliliters of concentrated hydrochloric acid are measured out. The solid is dissolved by heating with one-third of the alcohol and one-half of the acid. Another one-third of the acid is added and mixed by stirring. Next, acid is added slowly, drop by drop, until the product is completely converted to the hydrochloride. Two methods of testing this end product may be used. Either a drop of solution evaporates on a clean glass plate, leaving no trace of cloudiness in the residue, or a drop of the solution placed on Congo red paper causes the paper to turn blue.

Once the acid is added, the remaining alcohol is stirred in. Half of the ether is then added with stirring and the mixture is allowed to stand for fifteen minutes. It must be examined with great care since it is extremely volatile and flammable. Once the first small crystals are detected, the remaining ether is added at once. The vessel is stirred, covered and allowed to stand for twenty minutes to one hour. The mixture becomes nearly solid after an hour. At this point, it is filtered and the solids are collected on clean filter paper. The paper is wrapped around the crystals and placed on wooden trays, usually over lime rock, to dry. When the crystals of pure heroin hydrochloride are dry, they are packaged. Batches of 5 to 10 kilograms are commonly made at one time, the largest batch being an estimated 20 kilograms.

Chemicals used to isolate morphine from opium include ammonium chloride, calcium carbonate (limestone), and calcium hydroxide (slaked lime). The precursor chemical normally used in the conversion of morphine to heroin is acetic anhydride. Chemical reagents used in the conversion process include sodium carbonate and activated charcoal. Chemical solvents needed are chloroform, ethyl alcohol (ethanol), ethyl ether and acetone. Other chemicals may be substituted for these preferred chemicals, but most or all of these preferred chemicals are readily available through smugglers and suppliers.

Necessary laboratory equipment includes measuring cups, funnels, filter paper, litmus paper and a stainless steel pot. Only the most sophisticated heroin labs use glass flasks, propane gas ovens, Bunsen burners, vacuum pumps, autoclaves, electric blenders, venting hoods, centrifuges, reflux condensers, electric drying ovens and elaborate exhaust systems. Portable, gasoline-powered generators are often used at clandestine heroin conversion laboratories used to power various electrical devices.

Corrections to the text by Jim Hogshire:

Common Misconception Numero Uno appears in pakker's history of opium. It is the dreaded "soldier's disease"...

He says:

In the 1860s morphine was used extensively pre- and post-operatively as a painkiller for wounded soldiers during the Civil War...The inevitable result was opium addiction, called the 'army disease' or the 'soldier's disease'.

This is an example of anti-drug propaganda which sounds so damned *possible* few ever question it. And it has worked well for the Drug Warriors from the beginning, which was just a few years before the Harrison act was passed. In fact, this yarn was invented to portray opium and morphine as so powerful and so addicting that it could take over the soul of anyone, even against their will.

But on Cliff Schaeffer's Site there is an essay about "soldier's disease" that does question the story and, lo and behold, it's not true!

No doubt, opium was used very extensively in during the Civil War, and before and after it, too. But there is just no documentation of any mass addiction and the phrase "soldier's disease" or its variants didn't appear for something like 40 years after the war.

I think the essay is called "The Mythical Roots of US drug policy."

Another slight error I think is worth correcting is what pakker says about the Harrison Act:

"In December 1914, the United States Congress passed the Harrison Narcotics Act which called for control of each phase of the preparation and distribution of medicinal opium, morphine, heroin, cocaine, and any new derivative that could be shown to have similar properties. It made illegal the possession of these controlled substances."

The Harrison Act wasn't that bad. It did *not* outlaw heroin, for instance. That didn't happen until 1923. And it didn't make possession of opium, opiates or cocain illegal but pretended to be a tax measure only. The first time it was challenged, in 1916, the Supreme Court knocked it down in a 7-3 vote. Writing for the majority Justice O.W. Holmes acted outraged that the government would try to make criminals out of the majority of American citizens who all had some form of opium in their homes. If Congress were trying to legislate morals by this law with its "coating of constitutionality" coming from its supposed power to tax, they had another think coming.

What's kind of scarey is that in 1919, the Supreme court heard two other cases in which the law was upheld. Between 1916 and 1919 some of the judges had changed but it still wouldn't account for the 5-4 vote in favor of the government and (very strangely) overturning its own opinion so quickly -- something the Supremes just hate to do.

But, looking at the rosters it becomes apparant that *Holmes changed his mind*. I have still not completely verified this, but it sure looks like it. I can't figure out why in the hell he would do this, though.

As for the part about "any new derivative" with similar poperties, etc. is also not correct. That really didn't happen until 1986 with the Analog Substances Act.

Earlier versions of the "Harrison Act" outlawed caffeine, too. So I guess we can count ourselves lucky.

Btw, the poppy plant itself was outlawed in 1943 by the "poppy control Act" and then it was "repealed" in 1972 when the congressjerks realized the new Controlled Substances Act was sufficient to make them illegal.

And Pakker is right about what's illegal. Papaver somniferum is illegal. Every pat of the plant is illegal *except the seeds*. As soon as the seed sprouts, it seems to me, the thing is illegal.

Do not, repeat, do not, believe in Harper's author and human jackal Michael Pollan's carefully constructed "innocent gardene" defense because it will not work in front of a real-life judge. With all drugs, "mens rea" or "bad intent" is supposed.

OK, I gotta go now. Till later,

Jim
