


The Coca Plant

By Cliff Krol

Erythroxylum coca Lamark is a tropical shrub of the order Geraniales and the family Erythroxylaceae. Two tropical genera of the dicotyledons totaling approximately 250 species of trees and shrubs compose this family. Family characteristics are alternate, undivided, lobeless, toothless leaves, and small flowers in clusters from the leaf axils with persistent calyces with five lobes or sepals, five petals often with appendages, ten persistent stamens united at their bases, and three styles. The fruits are small drupes. (see Everett, 1981and Angiosperms in Brittanica Online) The name Erythroxylum comes from the Greek erythros, red, and xylon wood. Lamarck described the species *E. coca* in 1786. (Plowman,1982)

Distribution

Erythroxylum coca is cultivated in Africa, northern South America, southeast Asia, and Taiwan. It grows from 2-4m (8 feet) tall. The plants thrive best in hot, damp situations, such as the clearing of forests, but the leaves most preferred are obtained in drier locations, such as on the sides of hills. (Boucher) The Plants are found mainly in relatively small areas of Peru and Bolivia, the major producing countries.

The upper Huallaga Valley, along a tributary of the Amazon in Peru, produces 60% of the world's coca. In Bolivia, the crop traditionally was grown on steep eastern slopes of the Yungas region of the Andes Mountains at elevations of 1000 to 2000 meters. However, in recent decades, the lower-elevation Chapare Valley overtook the Yungas in production, and cultivation is now expanding into lowland rain forests. (see "Coca" in Britannica Online)

History & Traditional Uses

Archaeological evidence indicates that coca was domesticated by 1500 BC. In pre-Columbian times, coca was a major element of the economy (Hastdorf, 1987). Andean peasants and miners traditionally have consumed coca by sucking wads of leaves, keeping them in their cheeks for hours at a time. Often

the coca is combined with chalk or ash, which helps dissolve the alkaloids into saliva. Coca chewing reduces hunger pain, and workers say the leaves give them strength and endurance to work for many hours at high altitudes, often in extreme cold. Some of the healthiest and hardest-working Indians on the Colombian Amazon the Yukunas consume enormous amounts of coca leaves daily, but this not a problem as they have time to raise their crops, hunt, fish and supply their food. (Linales) Perhaps the most ancient use of coca in South America is its employment in various shaman practices and religious rituals. It enables the shaman to enter more easily into a trance state in which he can communicate with the spiritual forces of nature and summon them to his aid. It was the Catholic Church which first condemned its use, largely an account of its integral role in traditional spiritual life. (Britannica, 1998) With the Spanish conquest coca became an important commercial crop, grown in the Yungas to supply workers in the rich silver mines of Bolivia. In the late 1800's Europeans and north Americans learned about coca and begun importing it for elixirs and patent medicines. (Boucher, 1991) The period from 1880's to the 1920's was the United States first great cocaine epidemic. Scientists like Sigmoid Freud described it as a "magical drug" and encouraged it to family, friend, and colleagues to use it. The most well known use of the coca plant was in the popular soft drink Coca-Cola, but later dropped the cocaine as an ingredient in 1903. Today the plant is known primarily for the drug cocaine.

Economic importance

Initially cocaine had been used as a local anesthetic. Modern medicine has used coca to treat shingles and has been found to be an effective bactericide against gram-negative bacteria, and coccus bacteria. (Bastien, 1987) Coca has always been a part and parcel of Peruvian life and, above all of Peru's economy. Yet its importance has varied enormously throughout the countries history. The lawful gross domestic product of Peru for 1989 has been estimated at US $16 billion. (MacGregor) It is said that Bolivia " lives" off cocaine. An American Congressional committee recently indicated that Bolivia's yearly "income" from cocaine exports amounted to US%900 million. (Clawson, 1996) The profit margin is the difference between the above costs and prices paid for cocaine. The Undersecretariat for Alternative Development estimated that in 1987 the sale of cocaine paste had earned US$1, 036 million for local drug traffickers, and that as cocaine hydrochloride sold in the international market, it might have generated approximately US$7,800 million in 1987. (Mac Gregor, 1993) It is clear that North American cocaine dealers make ten times more than the Bolivian producers do. Although the overall make-up is enormous, the peasants who grow the coca receive less than 1.5% of the value for which cocaine is sold in the United States.

The Alkaloid

Cocaine is an alkaloid extracted from the leaves of the coca plant. Alkaloid content differs within the leave in occurrence of its distribution. In genera, the lower the altitude, the lower the alkaloid contents. Studies by Emanuel Johnson indicate that alkaloid content in leaves decreased in content after bud break. Alkaloid content is not uniform throughout the leaf, but the highest content reported is in the leaf stem. (Johnson, 1995) The process of extraction is based on the fact that cocaine changes its solubility according to the degree of acidity of the solvent. For extraction, the dry leaf is moistened with

carbonated water and then dried and soaked in kerosene to extract the alkaloid. Then it is precipitated with sulfuric acid, forming cocaine sulfate, which is dissolved in water. It is reprecipitated with soda, lime, or ammonia, the impure basic alkaloid then remaining as a whitish mass: is used so-called basic cocaine paste. If potassium permanganate is used to oxidize and separate impurities, the washed basic paste is obtained. This paste is dissolved in ether or acetone, treated with hydrochloric acid, and made to crystallize as cocaine. (Mac Gregor)

Misuse

In 1860 the German chemist, Dr Albert Neimann, isolated cocaine in the pure alkaloid form from leaves brought to Europe. During the following twenty years or so, cocaine was used extensively by the medical profession as a stimulant, a local anaesthetic, and as a "cure" for morphine dependence. (Arif, 1987) Cocaine misuse has reached epidemic levels in large areas of North and South America. The drug can be administered a variety of ways: Chewed, sniffed, injection, Free-basing, and the smoking of coca paste. There are many adverse physical consequences of cocaine use, probably most severe is death as a result of cardiac arrest. Cocaine has the highest degree of dependence potential. In laboratory animals the intravenous injection of cocaine initiates and maintains specific behavior patterns. Hungry animals will preferentially press the bar for cocaine rather than for food. (Arif, 1987)

Conclusion

Coca is no longer simply a minor crop used by peasants in a far-off part of the world. The Cocaine trade has become a huge industry, causing more problems within coca cultivation. Between the benefits of this crop and the illicit drug industry coca control has become a complicated matter.

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