Totem: The University of Western Ontario Journal of Anthropology

Volume 7, *Issue* 1 1999 *Article* 4

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The Transformation of Coca to Cocaine: An Overview of Traditional Drug Use and Modern Drug Abuse

J. Marla Toyne

The Andes Mountains of South America have been the heart of coca cultivation and production for thousands of years. For centuries coca has been an important part of the local indigenous people's diets and lives. Today in the highlands of Peru and Bolivia, coca is still consumed daily, primarily by the Aymara and Quechua peoples. Coca leaves play a key role in the medical, social and ritual activities of these peoples daily lives. On the other hand, cocaine hydrochloride powder, the narcotic derived from coca, has found a niche in the international scene as a recreational drug. As such, I will examine how 'drug' use in an indigenous community is very different from 'drug' use in a modern, capitalist society. Many of the attitudes held about cocaine as a narcotic have been transferred to coca. However, this negative transference is inappropriate, as cocaine is pharmacologically and socially utilized in a much different way than coca. Indeed, the biological and social significance that coca affords within the many Andean populations is very different from the novel use of cocaine, and its street derivatives such as crack, by the 'modern' world over. Essentially, the comparison between the physiological effect of chewing naturally occurring coca leaves, to snorting manufactured cocaine powder, is like "comparing fire hoses with flame throwers" (Karch 1998:56).

The focus of this research paper is the transition of coca from a "traditional" drug into an illegal substance. I want to discuss the role that both drugs play in terms of the health and lifestyle effects on the respective consumers, as one is arguably relatively beneficial, while the other is largely detrimental. It is worthwhile to note that many politicians, academics, and society in general, are largely swayed in their opinions and discourses surrounding coca use, by the negative literature and effects of cocaine. While certainly cocaine is a chemically manipulated derivative of coca, the two products are vastly different in terms of their use, physiological effects, social importance, and overall cultural importance, as will be discussed below. Lastly, I will also discuss the current changes occurring in Andean communities as a result of the cocaine industry and cocaine use by Andean peoples. Ironically, coca is a substance that was traditionally ignored by the international community, yet, with the popularity of cocaine a powerful global market stepped into the daily lives of the Andean highland peoples. Thus, this paper will take a historical approach to outlining the development of both coca and cocaine use, followed by an examination of the physiological, and psychological effects of both substances upon their respective users. The differences between the substances will be emphasized. Clearly, the transference of the discourse surrounding the use and misuse of cocaine, onto the use of coca by an indigenous population was irresponsible and inappropriate.

The History of Coca

When looking at the history and use of coca, it is important to examine the botanical development of the plant, regional developments of consumption, as well as, the archaeological record. Coca (Erythroxylum coca) is one of 250 species in the Erythroxylum genus (Plowman 1986:9). Although coca is cultivated in other areas of the world, such as Nigeria, Sri Lanka, Malaysia, Indonesia, and Taiwan (Karch 1998: intro), its consumption as a masticatory stimulant occurs only in tropical America (Plowman 1984:130). Coca leaves are grown and chewed in an extensive region along the western side of South America. Its north-south range runs from Columbia to Bolivia, while inland it is grown throughout the steep, eastern mountain slopes of the Andean valleys, all the way to the Amazon basin. It grows in a tropical region of high rainfall and poor, highly eroded soil, yet, it thrives producing up to four or more harvests yearly as a mature bush (Allen 1988:221). As a species it has also demonstrated a hardy resistance to insect pests and is relatively self maintaining (Allen 1988). Coca is usually grown at elevations of 500-1800 meters above sea level. Four species are grown in the Andean region, and are widely cultivated for their leaves. It is the leaves that contain the economic and pharmacologically important alkaloid, cocaine (see Plowman 1986 for species distribution).

The most widely spread and most commonly grown variation of coca plant is Erythroxylum coca coca (Hu1nuco or Bolivian coca). It is also the preferred leaf for commercial cocaine production (Plowman 1986:13). Other species, such as Erythroxylum novograntense novograntense are not used for cocaine production because they have lower levels of the cocaine alkaloid (Plowman 1986:21). Hu=E1nuco coca is known to grow at relatively higher altitudes, and it is believed that this is the cause of the higher cocaine alkaloid (Plowman 1986:12). There is also a positive correlation between coca chewing and high altitude residence (Hanna 1974). In terms of the botanical evolution of the plant, Plowman (1986) suggests that it may have first been sampled as a famine food by early nomadic hunting and gathering groups inhabiting the eastern Andes. Once the stimulating effects of the plant became known it probably became routinely or daily gathered from the forest (Plowman 1986:27). The development of four varieties of the plant occurring in different regions was the result of early intensive human domestication. Indeed, the ancestral strain of E. coca coca is still found in the wild, and little morphological, genetic or physiological changes seemed to have occurred through domestication (Plowman 1984:135).

The archaeological record has also helped to establish the historical importance of coca use in the Andes. The earliest archaeological evidence suggestive of coca leaf use is associated with ceramic lime pots of the Valdivia culture from Ecuador, dated ca. 2100 B.C. (Plowman 1986:23). Cartmell et al. (1991) were able, through the use of radioimmunoassay, a technique of microscopic analysis, to detect the metabolic product of cocaine in preserved hair of ancient mummies in Northern Chile. High concentrations of the cocaine alkaloid were recorded, indicating intensive or prolonged use of coca by the individuals examined (Cartmell et al. 1991). Others have looked at ancient osteological remains for evidence of the use of coca. For example, Langsjoen (1996) looked at the detrimental effects of coca use on dentition, as indicated by the accumulation of lime, which is used while chewing coca.

Both Cartmell et al. (1991) and Plowman (1984) outline other archaeological contexts that suggest prehistoric coca use. These include the presence of coca-leaves and associated paraphernalia as tomb offerings, such as lime gourds, ca. 400A.D. in Chile (Cartmell et al. 1991:260). Also ceramic figurines with bulging "coca cheeks" holding gourd-like lime containers have been recovered and are dated to the Moche culture of 100 –800 A.D. (Cartmell et al. 1991:260). Moreover, the use of coca is confirmed as of A.D. 500 by the discovery of preserved coca-leaf quid in the mouths of mummified remains from this time (Cartmell et al. 1991:260). This artifactual evidence is found outside of today's main coca producing region, simply because of differences in the preservation of archaeological remains on the coast, versus, the highlands. The very antiquity of these finds stands to support the long-history of coca use in the Andean region, and the central importance to which coca use was likely relegated by centuries of peoples.

Lanning (1967) believes the archaeological evidence demonstrates that coca was an important trade good between the coast and the cultivation areas in the mountains even before the Incan empire dominated coca distribution. Judging from the archaeological record and modern day uses, coca has been an important part of Andean life over the past 3000 years.

Coca Use Today

The different species of coca and the different ecological regions of importance, result in there being a variety of methods for preparing and consuming coca. The most common ways of consuming coca, in most areas, involve using the leaves of the plant. Coca leaves are used daily in the diet as though they were a food component, but are recognized as having special effects on the body. Although children may start or try chewing coca early on, it is generally a practice more commonly used throughout adult life, by both men and women. Although not everyone partakes in coca leaf chewing on a regular basis, most people at least consume it during special occasions. Since coca is mostly utilized in the Highland region, it is not a commonly observed practice in the more urban centres.

The dried leaves are taken into the mouth a few at a time and held against the cheek in a ball or "quid" which is periodically chewed or sucked. The description of the masticatory process as "coca chewing" is somewhat misleading as the wad of leaves is basically sucked to extract the bitter juices from the leaves. The moistening of the

leaves is done to extract the active alkaloids, of which cocaine is one. About 30-70 grams per day are consumed, although each session of "chewing" lasts only about 15 to 45 minutes (Plowman 1986:6). The addition of a lime or of the ash of a burnt plant is necessary as an alkaline to activate the alkaloid in the leaves when chewed (Plowman 1984:129). The lime, or llipta, is usually carried in a gourd or special container, and applied to the quid with a stick in small amounts, while the leaves are kept in a separate bag. Some Amazonian groups are also known for consuming the coca in powder form, but this is a less universal practice (Plowman 1984:137).

Biological Effects of Coca

The indigenous Andean peoples who use coca, state that they do so for reasons that are associated with those physical stresses most often associated with living at high altitudes, due to the lack of oxygen and low temperatures. More than 25 million people world-wide live above 3000 meters and "human adaptation to such environmental stresses depends not only on physiological responses but also on the interaction of complex sociocultural, demographic and biological factors" (Baker 1976: ix). The mastication of coca leaves releases chemicals that seem to facilitate living, working, and eating in the Andean mountains.

Coca's stimulation of the central nervous system relieves the high altitude stress of hypoxia, which is caused by the decrease of oxygen at higher elevations. Coca stimulates the respiratory system to compensate for the low oxygen levels, allowing the lungs to work normally. Another apparent benefit to chewing coca leaves is demonstrated by Hanna's (1974) study, which showed that coca aided in heat retention. The highlands have a significantly colder average temperature than lowland or coastal areas, and Hanna's (1974) research showed that individuals who habitually used coca had higher body temperatures, even in colder conditions, than those who did not use coca consistently. The cocaine alkaloid present in coca leaves acts as a mild stimulant to the central nervous system. Each leaf contains approximately one- percent cocaine and taken in such small doses it does not cause a major reaction in the body (Karch 1998:56). The actual effect of a regular dose (50mg average of most Andean people) is described as similar to the stimulation of a strong cup of coffee (Allen 1988:221). Furthermore, the minerals present in the leaves are thought to supplement a diet that generally has limited nutritional variety, because the extreme elevations limit the number of nutritional choices (Mazess & Baker 1964: 341; Bastien 1981: 3).

The benefits that coca provides to high-altitude dwellers is used by Hanna (1974) to explain why coca is adapted to grow and available to those individuals living at lower elevations, yet, it is almost exclusively consumed by those who live at higher elevations. Indeed, the use of coca is nearly universal at 4600 meters, less commonly used at 2500 meters and rarely used or non-existent at sea level (Hanna 1974:283). It is interesting that Allen (1988: 221) sees little convincing evidence for coca aiding in high altitude adaptation, however, she does note that coca certainly could help ameliorate the nutritional effects of living almost exclusively on potatoes and other carbohydrates.

As illustrated, coca appears to provide the Andean people with many varied adaptations to their environment and lifestyle. To the indigenous inhabitant of the Andean highland and traditional coca chewer, coca can be used to alleviate hunger, to enhance work ability or to provide energy, or to create a sense of warmth (Mortimer 1901). There have been many studies done to examine the adaptive function of coca (Martin 1970; Mazess and Baker 1964; Fuchs 1978). In looking at the claim of working ability, Hanna (1974:368) found that coca consumption did not increase work efficiency but may benefit work performance at high altitudes. The retention of body heat may be a factor in this relationship (Hanna 1974). In addition, Bolton (1979) examined coca's beneficial contribution to the management of problems of glucose metabolism; a serious condition for a substantial proportion of the population living at high altitudes in the Andes. Thus, the use of coca, which benefits all of these problems at high altitudes, seems to provide climatic adaptive benefits for those who consume it on a regular basis. It is interesting to note that no studies clearly define whether or not coca aids acclimatization to high altitudes. Most research dealt with individuals already residing at those elevations, not individuals who may have arrived or were not born at that altitude and how their heritage may have been beneficial to that climate.

There exists quite a lively debate surrounding the classification of coca as a health problem. The debate began in the 1940's from the studies done by Gutirrez Noriega and Zapata Ortiz, who felt that coca consumption was a serious factor involved in causing and sustaining malnutrition. These researchers concluded that there was "no medical problem of greater importance in Peru" (Grinspoon and Bakalar 1985:120). However, it is not the consumption of coca in particular that is responsible for inadequate nutrition, but rather the environmental and socio-economical status of the people living in the highlands that primarily affects their diet. Moreover, as mentioned, coca leaves are likely beneficial to the sparse and unvaried, highland diet (Martin 1970, Hanna 1974). Conversely, Pictegui (1976) and Burchard (1992) suggest that coca mastication does not affect food intake, nor does it modify protein, fat, caloric, iron, or other mineral absorption. In their research they found no evidence that coca chewing was at all beneficial in the overall dietary adequacy of their test subjects. It must be noted however, that no detrimental results were reported either.

Martin (1970: 432) has listed that vitamin B1, riboflavin and vitamin C are present in coca leaves. Allen (1988:221) also mentions that vitamin A, iron and phosphorous are minerals that can be extracted from coca. Furthermore, the use of lime provides calcium to the nutrient index of coca chewing. Plowman (1986:7) notes that 100g of Bolivian coca would satisfy the "Recommended Dietary Allowance" for many minerals. Thus, further investigation of past research methods and conclusions, as well as, new studies, needs to be undertaken to explain this paradoxical disparity between what is an obvious list of seemingly beneficial minerals, and the neutral results of the comparative studies.

Coca as a Medicinal Agent

The list of medicinal conditions for which coca has been prescribed as beneficial is extensive. A brief catalogue of the physical ailments includes: gastrointestinal illnesses, dental caries, arthritis, headaches, asthma, high altitude sickness complaints of dizziness, nausea, cramps, and for pain associated with broken bones, sores and infections (Martin 1970:423, Hanna 1974:290). The treatments include chewing the leaves as a quid to obtain the effects of the cocaine alkaloid, making a tea (mate) of the leaves, using it as a poultice or plaster and applying it as a local anaesthetic, or mixing the coca with other herbs (Carter et al. 1981:137).

In addition to its application as a healing drug for physical conditions, coca leaves are also used symbolically in a psychosomatic manner. Coca use is closely related and heavily emphasised during ceremonial occasions like fiestas, and in rituals associated with life crises such as funerals and wakes. The chewing of the leaves is said to have a calming effect on the nerves and acts to appease the individual. Times of high emotional stress can produce hypoglycaemia, a feeling of tension or anxiety, and thus coca helps to promote a more regulated, homeostatic glucose level (Bolton 1979:419). So coca consumption at ritual activities could be understood as a response to a physical need created by emotional stress, not just a socio-cultural practice.

Ritual and Social Functions of Coca

Although coca chewing fulfils a physiological need, the practice of chewing the leaf has developed other cultural functions. The strange properties of the leaves are attributed to the divine origins of the plant (Towle 1961:528) and, thus, its use in ritual functions is very important. Coca is culturally significant in mortuary practices. The coca leaves are shared with the deceased, who is regarded as the "source of continuing fertility of the living" (Dillehay 1995:325). Recall the mummy that was unearthed with the quid in its mouth, and how this shows the significance that coca had in burials (Cartmell et al 1991:260). Coca leaves are also used for cultural purposes of divination, sealing of social contracts, and as recruitment or payment for labour (Carter et al. 1981:119). The networks of cultivation and distribution of the leaves, between the highland and lowland regions, are commercial and trade systems that have been part of cultural relations for thousands of years (Boucher 1991:37).

According to Morgan and Zimmer (1997:131), it is widely accepted that traditional methods of consumption of coca are not associated with significant biological harm or social dysfunction. To the contrary, coca chewing is an important function of social cohesion. Burchard (1992:13) states that coca chewing in the Andes is both legal and very popular, and Lee (1989:24) estimates that 10,000 metric tons of coca per year

are used legally in Peru and Bolivia for chewing, or as medicine. It is not simply an addictive substance (Hanna 1974). Coca chewing "addiction" is said to be similar to that of habitual smokers and coca use can be fairly easily discontinued, however, many social aspects continue to promote the activity. There are those in political power and the academic sciences who believe that the use of coca by Andean peoples is pernicious and destructive, however, my interpretation of the evidence is that the positive effects of coca are well substantiated scientifically, as well as, being corroborated by the actual populations that include coca as an intimate part of their daily lives.

The Origin and Development of Cocaine

Cocaine is known to the world over as a white powder, hydrochloride that is inhaled, swallowed or injected for an euphoric high. It is produced pharmacologically from coca leaves by isolating and extracting the cocaine alkaloid. It was first discovered in 1860 by a German chemist Albert Niemann. Although Europeans knew of coca and its potential medicinal uses since the time of the conquest, it was never fully appreciated by Europeans until the 19th century (Grinspoon & Bakalar 1985:17). Grinspoon and Bakalar (1985) propose that the Spanish may have been too caught up in the extraction of gold and silver from Peru, and that in spite of the importance of coca to the internal economy of the colony, they never truly noticed it as a potential commodity for international trade. Unlike a product such as tobacco, which can also be chewed, coca never became a world trend. Coca chewing itself is restricted to the Andes. The cumbersome and unviable way of transporting the bulky, easily perishable leaves was also detrimental to its introduction into the global economy. It was not until the principle active ingredient of the coca plant was extracted that the plant gained international attention (Morgan & Zimmer 1997:131).

It was first marketed as a general curative product, as a cure for opium addiction, an energy tonic (Coca-Cola), a headache remedy, an anti-depressant, an asthma remedy, and finally most importantly, to the medical sciences, as a local anaesthetic (Karch 1998). The more popular side of the patent medicines included coca cigarettes, coca toothache drops, and coca syrups (Boucher 1991:74). "Vin Mariani" was a patented extract of coca and wine created and successfully marketed by Angelo Mariani in 1863. Freud in his 1884 book, "On Coca," was instrumental in popularizing cocaine use, as he prescribed it as an excellent stimulant and praised its anaesthetic qualities (Forno 1981:312). Its notoriety grew at the end of the 19th century, resulting from overuse that could produce intoxication. It came to be recognized that cocaine was causing a reliance or dependence similar to that of the morphine and opium addictions that it was supposed to rehabilitating (Platt 1997:6).

In the late 1800s, cocaine came to be recognized as potentially addictive and dangerous, and as a growing menace to society. In 1915, cocaine was banned from free consumption and classified as illegal (Wilson & Zambrano 1994:299). Seven years later, the United States Congress prohibited the importation of cocaine and coca leaves, and classified it as a narcotic with criminal penalties for possession (Grinspoon & Bakalar 1985:41). With its prohibition and anti-cocaine legislation, cocaine became deviant and went into the black market, augmenting the negative sentiment towards it. Use declined between the 1930s and 1960s, but was followed by another cocaine "boom" in the 1970's, as cocaine powder was easier to transport than the bulky leaves of marijuana (Clark 1997). In the years that followed, there was increasing awareness of the threat that cocaine posed to the health and well being of many Americans.

The next stage in the expansion of this drug was in the early 1980s, when increased prices of powdered cocaine made it an elitist drug. Furthermore, derivatives such as freebase and crack cocaine, that are smoked as opposed to snorted, were further refined to achieve a quicker high for a lower price, and thus to appeal to a wider market (Morgan & Zimmer 1997:133). In 1985, an estimated 100 tons of cocaine entered the United States illegally. This large influx prompted President George Bush to forge his "War on Drugs" campaign the following year (Cusack 1986:69). Today cocaine and its derivatives are considered highly addictive and very destructive drugs, yet, their popularity and prevalence continue.

Production of Cocaine in Andes

The production of cocaine takes place mostly in the Andean zone, although it is not produced for consumption locally. Cultivation of the leaves, drying and the initial processing of the leaves into cocaine paste is now done right in the field where it is harvested, so as to eliminate the need to transport the bulky leaves (Lons & Sanabria 1997:15). Since the leaves only contain a small percentage of the cocaine alkaloid, great amounts of the leaves are needed to produce a concentrated product: 112 kilos of leaves to produce one kilo of cocaine paste (Lons & Sanabria 1997:15). Kerosene or gasoline is mixed with sulphuric acid, ethyl ether and other different chemicals to manufacture the cocaine paste 40-50 percent cocaine alkaloid, which is then increased to 85 or 90 percent alkaloid when it is converted into a cocaine base (Lons & Sanabria 1997:15). The paste is then transported to Colombia where, in specialized laboratories, it is refined into pure cocaine hydrochloride (Lons & Sanabria 1997:15-16). In 1986, 260,000 acres were under cultivation, most of which were processed into a cocaine paste and exported to the northern hemisphere (Starn et al. 1995:409). Essentially, all cocaine that enters the United States enters as cocaine hydrochloride powder (Morgan & Zimmer 1997: 133).

Uses and Biological Effects of Cocaine

Cocaine is primarily a recreational drug of the Western World. It is preferably consumed through injection or inhalation as it is absorbed quicker into the system, than by swallowing. Cocaine is a drug of the upper classes because of its expensive price, however, with the development of crack, a smokeable form of cocaine, it is more readily available to people of lower incomes. Smoking is an even faster method of obtaining a reaction to the stimulant or "getting high". The ingestion of cocaine produces a physiological state characteristic of excitement, which prepares the body for exertion, flight or aggression (Allen 1988:222). The drug acts as a stimulant producing a psychoactive effect by interacting with the central nervous system causing it to perform ordinary functions or normal body mechanisms more intensely (Morgan & Zimmer 1997:136). One is made aware of the act of breathing as it is accelerated and intensified. The more purely refined the cocaine, and the larger the dosage, the more extreme the reaction and the greater the "high". The psychological reaction produces feelings of extreme well-being, "enhanced alertness, intensified awareness of environment, intense energy, magnification of normal pleasures, decreased anxiety and increased self-confidence..." (Platt 1997: 62). The acute symptoms of cocaine use are vividly described in Grinspoon and Bakalar's text (1985:184), and can best be summed up as overwhelming euphoria.

Some of the problematic, chronic conditions that result from use of cocaine are, signs of anxiety, agitation, insomnia, anorexia, weight loss, hyperactivity, paranoia and euphoria (Forno et al 1981:313). The direct association of cocaine use and death are difficult to recognize, but often cocaine abuse has resulted in fatalities (Grinspoon & Bakalar 1985:140). Pettiti et al (1998:596) notes that there are "clear mechanisms by which cocaine and amphetamines might increase the risk of stroke". When involving other substances, cocaine use can prove fatal, due to an over stimulation of the central nervous system. Karch (1998:63) claims that long term use of cocaine is said to cause the heart to become slightly enlarged due to the extra effort involved in the body's absorption and processing of cocaine. It should be noted as well, that although illegal in the United States, some doctors and physicians there still prescribe cocaine in controlled doses to treat severe pain (Nadelman 1997:300).

Discussion

Good Drug versus Bad Drug?

It is clear from my description of coca and cocaine that vast differences exist between them, in terms of use, dependence, and health effects. It is important to consider drug consumption as a socio-cultural phenomenon. Addiction or dependence is defined as the "continued use of a drug despite the appearance of negative consequences for the user's health, work, financial stability, relationships and the like" (Morgan & Zimmer 1997:142). The term's "addiction" and "dependence" both contain negative connotations, in that use is neither naturally occurring, nor useful for the body. Traditional habitual use of coca has yet to demonstrate any long-term mental or physical defects in the people of the Andean region who have been consuming the leaves for millennia.

Furthermore, studies show that there are no detrimental effects if chewers are denied coca for a long period of time (Hanna 1974:282). Coca's relationship to health and nutrition is seen as beneficial, as described previously. I believe that coca represents a 'drug' that has been successfully adapted into the Andean diet. It has practical medical uses, physiologically enhancing functions, as well as, culturally advantageous applications. Yet, it is precisely the constant, daily ritual of coca consumption that can be misinterpreted as a dependence or addiction. Its use is a time-honoured tradition with consumption regulation embedded in ancient practise. Coca is rarely abused because the dose is socially controlled and it would be a profound deviance to excessively misuse a symbolic custom in such a way. Indeed, Bolton tells of how his study group of Andean peoples warned him that large quantities would be bad for one's health (1976:631).

Cocaine, in contrast to coca, has a proven negative and addictive effect on its consumers. Its physical effect of causing anorexic-like behaviour is clearly detrimental to an individuals diet. Cocaine use poses a greater potential for damage as stressed in the evidence of higher risk of neurological disorders in infants from prenatal cocaine use (Meyes 1992:11), and the association of cocaine to acts of violence and/or reckless and/or irrational behaviour (Benowitz 1991). In terms of addiction, Platt and others (Grinspoon & Bakalar 1985; Morgan & Zimmer 1997), contend that cocaine used by itself is not capable of creating a physical dependence, but the pleasurable, reinforcing, and rewarding effects make it a highly psychologically addictive substance (1997:71-94). Indeed, it is the contribution of many different factors that result in cocaine use and abuse. Leshner (1997:45) sees addiction "as embedded [in] behaviour and social context[s]". Problems such as family history, social deviance, and criminal or violent behaviour, have been associated with cocaine misuse in various studies (Platt 1997:114). Cocaine's negative reputation and illegal standing is that of a maladaptive and abusive drug.

Due to cocaine's ability to induce extreme feelings of euphoria, and the illicit nature of the drug, cocaine has come to represent a type of escapist product. The 'Cocaine Culture & Lifestyle', in association with popular literature and music, supports this expressive freedom of behaviour (Grinspoon & Bakalar 1985:60). Forno et al. (1981:311) discusses the creation of freebase and crack as "example[s] of drug abuse trends toward a search for new ways of using old drugs in ways that produce enhanced euphoria". As with other chemical stimulants or intoxicants, studies have shown that lifestyle and behaviour are often affected negatively by the addictive nature of the cocaine (Platt 1997).

It is possible to evoke the same arguments used to demonstrate the beneficial nature of coca, when critiquing the use of cocaine. Cocaine could be viewed as an 'adaptation', given that it evolved through chemical processing from coca and is currently fulfilling a 'need' in the world. However, unlike coca, cocaine shows no physical benefits from its use, although it arguably has psychological benefits, however short-lived they may be. Indeed, it could be argued that in order to adapt to the modern day pressures and stresses of living in a developed nation, particularly in the United States (where most of the world's cocaine is consumed), the pharmacological use of cocaine could act as a stress reliever. Unfortunately, the detrimental effects on the individuals physical and mental health outweigh its momentary mental relief. The negative behaviours and lifestyles that are associated with cocaine use, as well as its extremely addictive nature, far outweigh any possible benefits. Thus, I believe that the powerful reinforcing and dependency-inducing nature of cocaine makes it mal-adaptive.

Overall, one simply cannot compare the use of coca with the use of cocaine, and as such, the 'good' versus 'bad' argument that often accompanies the use of any 'drug' should be taken up independently with each substance. Transferred connotations and perceptions need to be laid aside, in favour of objectivity, as well as, a respect for the knowledge and competence of the Andean populations who have been using coca, not cocaine as we have come to know it, for thousands of years. Furthermore, the definition of the term 'drug' needs to be taken on, as it is questionable if the same term should be used to describe two vastly different substances. The negative discourse that surrounds cocaine use, has in many ways been transplanted onto the use of coca, despite the vast differences between the two substances, particularly in the United States and Canada, where first hand experience or knowledge of coca and it's uses and importance in the Andean highlands is lacking. It is partially this false transference of perceptions that has resulted in

many academic and political statements which brand coca as a health and lifestyle threat.

On the other hand, some argue that where coca's virtuous history makes it acceptable, the newness of cocaine use gives it a corrupt and mal-adaptive air. Henman (1990:578) believes that "what distinguishes traditional uses from modern ones is not their inherent virtue, but the fact that they have had more time to develop and coalesce". While Henman (1990) certainly has an interesting point, I have outlined in this paper that that it is not merely the antiquity of coca, versus the newness of cocaine, that makes the substances different in their cultural acceptance, but rather, the actual physiological, psychological and resultant behaviours that distinguish the two drugs. However much of this difference is the result of the Andean peoples being 'adapted', physiologically and culturally, to the daily use of coca, is beside the point.

Cocaine and The Global Market

The development of cocaine has also spurred coca expansion into a principle cash crop in the Peruvian and Bolivian economies. As of 1995 approximately 33 percent of Bolivian land (50,000 hectares) was devoted to coca agriculture, producing a resounding 27 percent of the world's leaf output (Clawson & Lee 1995:132). This estimate of land use, however, should be increased as many of the farmers cultivate coca illicitly on private, hidden plots. In recent times of economic trouble, peasants have been increasingly persuaded by better returns, to cultivate coca, rather than legal export crops. Coca yields a much higher per acre revenue (De Franco & Godoy 1992:385). This increasing dependence by the Bolivian cultivators on a single crop, and the nation's dependence on cocaine dollars for the local economy, has made Bolivia vulnerable to the global cocaine market and fluctuations of demand and confiscation (Labrousse 1990). Increased cultivation of coca for illegal production of cocaine has greatly affected the Andean region.

Cocaine production in the Andes has also affected the rest of the world, as seen when George Bush declared his "War on Drugs" in the 1980's. His aim was to destroy cocaine at its source, or in other words, to stop the manufacture of cocaine in the Andes (Cusack 1986: 69). Thus, the Andean region and its populations who had become relatively dependant on the market value of cocaine are extremely vulnerable to international narcotic policies, especially when these polices are instituted by the most powerful, and economically strong nations in the world.

A New Market? - Cocaine Use in the Andes

In other ways, the Andean region is in the midst of another change, as some cocaine producers have also become cocaine users (Negrete 1991). There is currently an increase in the use of the concentrated cocaine base in a smoked form called "ketes" (Morales 1994:179). Those in control of production are increasingly paying the workers with the product itself. An ideal system that releases the produces from cash payments to their workers, while simultaneously creates more users and dependants of the drug. The use of cocaine has affected all social groups and ages in the Andean region and is a growing concern for local peoples. Indeed, it can be seen that cocaine, as the Western industrialized worlds cultural 'vice', has initiated an imitation of the drug's fashionable use by the Andean peoples (Lons & Sanabria 1997:145). Further cross-disciplinary study needs be done in the Andean region to examine the effects of the use of cocaine at a national, community, and individual level. How is cocaine use by Andean peoples perceived by the Andean communities? Is this understanding different from the perceptions of cocaine use by the rest of the world? Are these findings in any way a result of the long-standing acceptance and use of coca in the Andean highlands? Clearly, at this point, many questions remain to be answered. Further examination of the complex, intertwined relationship between coca and cocaine should reveal processes of global and community acceptance, persecution, and use, that will inform international monetary, ideational, and cultural power-relations.

Conclusion

With coca, we can see how the development of a purified form of the alkaloid element cocaine has transformed the plant into a potentially detrimental narcotic. The dichotomy of "good" drug versus "bad" drug can be seen with coca and cocaine in terms of the effects on health, dependence, as well as, their adaptive functions. Coca's role in daily life, and as a symbol of cultural identity, has been a part of the Andean

peoples culture in beneficial ways for thousands of years. Conversely, cocaine, classified as a novelty substance, creates an escapist reality in a capitalist consumer society. The production from one commodity to the other has brought the Andean countries into the global market to meet the demands of the United States and other countries consumption patterns. Unfortunately, cocaine's addictive nature has made it a malfunctioning social ill, which United States policy advisers believe can be cured by eradicating coca. Thus, the Andean region is in an extremely precarious position. It is subject to the whims of international market demands and narcotic policy making, as well as, facing the potential eradication of a substance that has been a part of their daily lives for centuries, partially because of the misconceptions and negative discourse that has been transplanted inappropriately onto coca. The differences between these two related drugs are clear, yet in the minds of many individuals the only way to stop cocaine abuse is to prevent the production of coca. However, coca and its patterns of use should not be judged in terms of its abusive derivative, cocaine. Although coca is still used today in its archetypal role as a benefit to Andean society, the development of a detrimental drug, such as cocaine, has changed how coca is perceived in the world. Truly, one can see how the whole world has become involved, however accidentally, in the judgement, mitigation, and alteration of the Andean highland peoples lifeways.

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