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History has been unjust to the coca leaf, denying it distribution on a global scale despite its proven value as an energy enhancer, and limiting its potential for widespread use as a healthy alternative to all sorts of chemical stimulants currently available on the world market.

The inclusion of the coca leaf in the 1961 Single Convention's lists of drugs liable to abuse, and therefore subject to international control, has not produced the effect originally desired: traditional use - whether by chewing the leaves or drinking them in an infusion - is still widespread, though largely limited to a few countries where such practices have historical antecedents. Potential demand is high, particularly for coca tea. The ban of even this innocuous custom is still one of the demands repeated annually in the statements of the INCB, the interpretive body of the UN control system. This unreasonable posture has recently led to a formal request from one government to abrogate the articles of the 1961 Convention that demand the abolishment of coca leaf chewing.

Many myths surround the coca leaf. Radically opposed views and opinions can be heard in the polemical debates surrounding this plant, and those not familiar with the subject are easily lost among all the apparent contradictions. The debate is politicised and has become subject to extreme ideological positioning. For some the coca leaf is as addictive as its best-known derivative cocaine, while others argue that it can cure half the diseases of modern times. For some, coca growing is the main cause of environmental degradation, while others claim that coca helps to protect the soil and prevents erosion. Many other examples can be identified, equally strong in their opposing contradictions.

The coca leaf has been used and misused for many ends, each of them suiting different interests and agendas. Even its very name has been appropriated by a soft drinks producer, which still has difficulties in admitting that the plant is used to produce its "black gold". Every day press accounts around the world use the word coca in their headlines, when they refer in fact to cocaine.

Amidst all this confusion, Bolivia's President has recently announced that his country will step forward to undo the historical mistake of including the coca leaf in the 1961 Convention. Although the claim that coca is part of the identity and history of the Andean/Amazon region is unlikely to be questioned by most countries, a possible removal of the coca leaf from the international control system is still met with considerable scepticism. The reasons for such a degree of resistance – which we believe to be mistaken and inappropriate - have motivated the production of this briefing paper

The present issue of Drugs & Conflict intends to debunk and disentangle the most prominent myths surrounding the coca leaf. It aims to clear the air and help steer the debate towards a more evidence-based judgement of the issues. Discussion has been stuck for too long at the point where it is now, and - sometime in the near future - political decisions will need to be made on coca's fate and legal status.

Persecuting plants and the people who grow them is still a basic ingredient of drug policies around the world. One Andean president recently announced he would like to see farmers that grow these plants incarcerated. This not only constitutes a basic human rights offence, since it aims to punish poor families in search of a viable and sustainable form of agriculture, but it also demonises innocent plants, and thus Mother Nature herself.

Not surprisingly, the grey area between extreme positions on the coca leaf offers sound evidence on which we can form a balanced perspective, and hopefully treat this plant with the respect it deserves. The time has come for humanity to recognise its past mistakes on this question, and given the chance, to repair them and finally come to its senses.

The myths, both positive and negative, surrounding the use and cultivation of coca leaves represent extreme versions of a continuum of ideas about this psychoactive plant, and in most cases contain elements which are not entirely distant from the truth. By identifying the myths in pairs, each of these marking the extreme end of a given subject of debate, our aim is to pinpoint the middle ground where a new evidence-based consensus can emerge regarding coca's undoubted stimulant, nutritional and therapeutic properties. The areas of current concern are the following:

1. *Coca and nutrition. ("The use of coca is symptomatic of hunger and malnutrition"/ "Coca is a solution to the world's hunger problem")*
2. *Coca and alkaloids. ("Cocaine can easily be extracted from coca leaves"/ "Coca leaves contain no cocaine")*
3. *Coca and addiction. ("The use of coca produces a form of drug dependence"/ "The use of coca will cure dependence on cocaine and crack")*
4. *Coca and the environment. ("Coca cultivation is devastating the rainforest"/ "Coca is an ideal crop for poor soils in the tropics and will be cultivated everywhere once declared legal")*
5. *Coca and society. ("Coca farmers should be identified as drug traffickers"/ " Coca farmers only grow coca to satisfy traditional indigenous uses")*

1. COCA AND NUTRITION

It has long been common among superficial observers to confuse the use of coca with an inadequate diet, and thus to claim that coca is in some specific sense responsible for malnutrition among the Andean population. As a justification for the maintenance of current coca prohibition, this view was restated to the international press on publication of the International Narcotics Control Board (INCB) Report for 2007. In his presentation, the Board's President, Philip Emafo, declared his personal view that *"it is not good for working people"* to chew coca, since by depriving them of hunger it prevents them enjoying **"***an appropriate level of nutrition***".**[1] At the opposite extreme, however, there exists an increasingly vocal lobby which defends the use of coca not so much as a stimulant, but as a food supplement, and sometimes engages in extravagant claims regarding coca's dietary benefits.

The association of coca with malnutrition has a long institutional history, having evolved from the plainly racist prejudices of nineteenth century travellers via the psychiatric establishment in Lima[2] where coca came to be associated with poverty, backwardness, and a long list of physical and mental "alterations". Crucially, such links formed the basis for the condemnation of coca chewing in a report presented to the international community in 1950, known as the report of the *Commission of Enquiry on the Coca Leaf*. This Commission had been given a mandate by an Economic and Social Council (ECOSOC) resolution 159 (VII) IV on August 10, 1948, to "*investigate the effects of chewing the coca leaf and the possibilities of limiting its production and controlling its distribution*".[3] The resulting document, prepared after a brief visit to Peru and Bolivia by a group of "experts" led by Howard B. Fonda, then director of the American Pharmaceutical Manufacturers' Association, drew many of its arguments from the work of the Peruvian psychiatrists Carlos Gutiérrez Noriega and Vicente Zapata Ortiz, who claimed: "*We have already pointed out that coca diminishes appetite and allows one to live with a minimal food ration. In consequence... coca may be one of the factors which condition the poor nutrition of regular users, and poor nutrition is one of the factors which favour the toxic effect of the drug.*"[4] Modern defenders of this school are going even further by saying: *"(flour of) coca leaf has no nutritional value whatsoever and is toxic for human consumption"*[5].

The malnutrition thesis was subsequently

[1] *La Razón*, 2007, Bolivian newspaper, "*La coca genera tensión entre la ONU y el Gobierno boliviano*", 1st March 2007

[2] Valdizán, H., 1913 "El cocainismo y la raza indígena." *La Crónica Médica* (Lima), 15 August 1913.

[3] Report of the Commission of Enquiry on the Coca Leaf May 1950, *ECOSOC, Official Records, Fifth Year twelfth session, Special Supplement No.1*, Lake Success, New York, July 1950, E/1666 E/CN.7/AC.2/1, page 4, 2nd par.

[4] Gutierrez Noriega and Zapata Ortiz 1947: 122

[5] Zavaleta, A., 2009 Chief of Investigation of the Peruvian NGO CEDRO Centro de Información y Educación para la Prevención del Abuso de Drogas, "*Cedro y ONUDD critican uso de la hoja de coca*", *El Comercio*, March 14, 2009.

repeated and rubber-stamped by the ECOSOC report, and ultimately served as an important scientific justification for including coca leaf in Schedule I of the United Nations Single Convention of 1961, arguing that coca chewing "*inhibits the sensation of hunger, and thus maintains, by a vicious circle, a constant state of malnutrition*".[6] In this study, dissenting views were absent; in particular, the work of the noted Peruvian physician Carlos Monge, who directed the Institute of Andean Biology in Lima and headed the Peruvian Commission on the Coca Leaf, which had been set up in 1949 to cooperate with the ECOSOC mission. A direct conflict of interests and personalities existed between the two commissions, in which a central issue concerned the interpretation of the coca-and-nutrition argument, and which led to an acrimonious exchange in the anthropological journals *America Indígena* and *Peru Indígena* through 1952 and 1953. The Peruvian Commission made the simple observation that none of the diseases usually associated with malnutrition - such as pellagra, beriberi, scurvy or rickets - had ever been present in the central Andes, a finding which was belittled and ultimately ignored by the ECOSOC mission.[7] Meanwhile Dr. Monge's dissenting report and supporting documentation, transmitted by an increasingly exasperated Peruvian Ministry of Foreign Affairs at ECOSOC and other UN bodies, remained forever excluded from the official register. In revising the bibliography of the ECOSOC study, it becomes clear that not all the relevant literature available at the time of the study was taken into account, a fact that reinforces the idea that this commission of "enquiry" had been set up with a predetermined view of its ultimate "findings".

More recent ethnographic accounts[8] have shown that the use of coca is in no way perceived as a substitute for food among traditional users; rather, coca is often chewed after a meal, when the stomach is full, in a digestive role similar to that of tea or coffee. Detailed studies of dietary intake indicate a role for coca in stabilizing blood glucose levels among populations heavily dependent on carbohydrates, and thus in palliating – rather than exacerbating – the nutritional deficiencies produced by inadequate land, income or environmental resources.[9] A comparison of coca with other major food sources has shown that it is an excellent source of vitamins B1, B2, C and E, and in particular of mineral elements such as calcium, potassium and phosphorus.[10] If anything, Dr. Monge's position was excessively cautious; his emphasis on the utility of coca in adapting to life at high altitudes could be interpreted as implying that coca is largely superfluous to a diet in the middle valleys, the lowlands, or on the coast. Both the present-day distribution of the use of coca, and the very extensive archaeological record, demonstrate that this is simply not the case.

Having accepted that coca plays an important nutritional role in the traditional Andean diet, it is but a small step to seeing it in a wider contemporary healing capacity, that is, as a crucial ingredient in the restructuring of dietary preferences for a population that has been over-exposed to the processed foodstuffs known as "junk food". This perspective, which has acquired a considerable following particularly among the middle classes in urban Peru, stresses the figures contained in the often-quoted Harvard study[11], which compared the nutritional values of coca with other major food crops. Crucially, however, the comparisons were made considering a daily intake of 100 grams of each of the different plants. While this quantity of fresh maize, for example, would be just a light snack, 100 grams of coca – in leaf or ground flour form – would be well in excess of the daily intake of even the most inveterate *coquero*. Miners in Potosí, whose food taboos do not allow them to take any other sustenance on their 12-hour shifts underground, have been found to consume

[6] United Nations, Economic and Social Council (1950) Official Records, Fifth year: twelfth session. Special supplement No.1. Report of the Commission of Enquiry on the Coca Leaf, May 1950, Lake Success, N.Y., E/1666- E/CN.7/AC.2/1, Page 93, Chapter XIX, D 1

[7] Monge 1952, 1953

[8] See for example, Allen 1988, Carter and Mamani 1986.

[9] Bolton 1976, Burchard 1975.

[10] James, A., Aulick, D., Plowman, T., 1975 "Nutritional Value of Coca", Botanical Museum Leaflets, Harvard University 24 (6): 113-119.

[11] Duke, Aulick, Plowman 1975

between 25 and 45 grams of coca leaf daily.[12] Most agricultural workers use even less, and thus it is disingenuous to use the 100-gram chart as proof of coca's enormous nutritional potential.

There is a further reason why coca is unlikely to become a major food source – its cost. In the cultures where it is used traditionally, coca is not viewed as something to be eaten, but rather as something to be absorbed through the mucous membranes of the mouth, or drunk in the form of an infusion. This privileges its medicinal and stimulant effects, rather than its brute nutritional content, and confers on coca the status of a "ritual lubricant" or "necessary luxury", which in terms of local income requires a degree of financial sacrifice. Of course, this is not a significant issue to the relatively affluent urban consumers who are the most enthusiastic advocates of coca-as-food, but it certainly sets limits on the potential role of coca in ameliorating the nutritional status of poor and marginalized populations. Only in the actual coca-leaf producing regions, where both malnutrition and coca availability are major features, could it deliver on its promise to solve world hunger, and even here it would require an inventive new cuisine and a significant change in eating patterns.

Thus we are confronted with the need to temper an enthusiasm for coca's undoubted dietary contributions with a cool look at both the manner it has been consumed over the millennia, and the real benefits of currently fashionable innovations in the kitchen. In admixtures to grain flours, in pastas, breads, cakes and biscuits, or as an additive to soups and porridges, few cooks or bakers would recommend more than 5% coca flour in the total mix. In this proportion, it simply cannot be ingested in quantities likely to make a serious impression at the level of basic carbohydrates, oils and proteins. However, its contribution in terms of vitamins, and particularly of mineral elements such as calcium, deserves recognition – both in supplying these elements where they are lacking in the diet, and in terms of boosting their bioavailability and ultimate absorption by the human organism. One feature of recent experiments has been particularly striking: the use of coca as a calcium source for geriatric populations, many of whom show a pronounced intolerance to traditional sources of this mineral, such as diary products.[13]

In the years since coca flour's popularity began to increase, many column inches of the Lima press have been dedicated to trashing the argument that coca could be a good source of calcium. With absolutely no scientific evidence, authorities have claimed that – although calcium is definitely there, and in remarkably high concentrations (Duke, Aulick, Plowman 1975) – this cannot really be assimilated by the human organism. No real reasons are given for this, but – according to the NGO CEDRO – it is somehow connected to "intoxication" by alkaloids dangerous to human health.[14] The head of the Faculty of Pharmacy in Lima and Adriana Cordero, the author of the study on which CEDRO´s warning had been based, went on record to deny such findings and denounce their manipulation by the anti-coca lobby – but predictably, this rectification was given much less space than the original scare story.

The nutritionist Sacha Barrio, one of the few media figures in Lima who take a more sanguine view of coca's benefits, maintains that – among the many factors inhibiting the assimilation of calcium – prominence should be given to the ratio of this mineral and phosphorus, which has the capacity of blocking calcium uptake. To be efficiently absorbed, calcium must outweigh phosphorus by a ratio of 2 to 1 – in coca this ratio is a comfortable 5:1, which explains the many anecdotal accounts of its use in arresting osteoporosis and healing broken bones. One should also consider, following Baker and Mazess (1963), the contribution of calcium made by the alkaline admixture used in traditional coca chewing, as well as the well-documented assimilation of vitamins established by Collazos (1965) - both of which add weight to the idea

[12] Carter, W. and Mamani, M., 1986 *Coca in Bolivia*, La Paz, Juventud.

[13] In an interview the Peruvian newspaper La República, September 27, 2004, had with several nutritionists, various examples were given of effective treatment for several geriatric diseases such as chronicle anaemia, depression, osteartrosis, urinary infections, and as a general immunity/defence enhancer.

[14] in *Mundo Médico,* September 2005

Harvard Study - Nutritional Value of Coca Leaf (Duke, Aulick, Plowman 1975)

A study done by a team at Harvard University found that the coca leaf contains a rich store of nutrients, more than many other well-known food plants. These were analysed individually in the full study, and then lumped together for a general comparison, which we publish here:

	COCA (100 grs)	Average nutrients of 30 food plants (100 grs)
Calories	305	279
Proteins	19.9 g.	11.4 g.
Fats	3.3 g.	7.9 g.
Carbohydrates	44.3 g.	37.9 g.
Calcium (mg)	1749	99
Phosphorus (mg)	637	270
Iron (mg)	26.8	3.6
Vitamin A (iu)	10000	135
Vitamin B1 (mg)	0.58	0.58
Vitamin PP (mg)	3.7	2.2
Vitamin C (mg)	1.4	13.0
Vitamin B2 (mg)	1.73	0.18

FOODS USED FOR COMPARISON PURPOSES:

10 CEREALS
Amaranthus caudatus, Oriza sativa, Avena sativa, Chenopodium pallidicaule, Chenopodium quinoa, Hordeum vulgare, Secale cereale, Coix lachryma jobi, Zea mays and Triticum aesticum.

10 VEGETABLES
Canna edulis, Capsicum spp., Allium sativum, Arracacha xanthorriza, Ipomoea batatas, Cyclanthera pedata, Cucurbita maxima, Allium cepa, Brassica oleracea and Tropacolum tuberosum,

10 FRUITS
Persea americana, Ananas cosmosus, Musa sapientum, Cocos nucifera, Passiflora mollissima, Annona cherimolia, Prunus persica, Fregaria spp., Annona muricata, and Ficus carica.

of coca as a modest but reliable source of valuable micro-nutrients.

In conclusion, the use of coca leaves is neither a cause of malnutrition, nor a total panacea for the dietary deficiencies produced by imbalances in modern eating patterns. It has a significant role to play as a nutritional supplement, and this is equally useful in many different population groups and many diverse diets and cuisines. However, it cannot be too often stated that the principal benefits enjoyed by coca consumers reside less in the nutritional realm than in that of its well-documented, historically attested applications as a stimulant and herbal medicine. And here, it would be dishonest to ignore the role played by its undoubted alkaloid content.

2. COCA AND ALKALOIDS

The extreme positions in this discussion have an even longer and more ideologically charged genealogy than those in the coca and nutrition debate. With Albert Niemann's discovery of cocaine in 1859, a considerable body of scientific opinion took the view that coca's properties were entirely attributable to the presence of this alkaloid. The young Sigmund Freud was of this persuasion: "*The experiments carried out recently with the cocaine prepared by Merck in Darmstadt alone justify the claim that cocaine is the true agent of the coca effect...*"[15] A counter-current emerged around observers of traditional coca use in the Andes, such as Henry Rusby, who argued forcefully: "*With certain restrictions it may be said that the properties of cocaine, remarkable as they are, lie in an*

[15] Freud 1884, in Byck 1974:53

altogether different direction from those of coca as it has been reported to us from South America".[16] This received the enthusiastic backing of the nascent industry in "whole coca" products, such as Vin Mariani and the early Coca-Cola, and – with the publication of William G Mortimer's *Peru: A History of Coca* in New York in 1901 – these interests seemed poised to set the record straight. Medical opinion, however, moved decisively in the opposite direction, and the progressive criminalization of cocaine led finally to coca being tarred with the same brush, and its industrial uses restricted to flavourings with the alkaloids removed.

Many present-day attitudes are traceable to this early phase of the debate; on the one hand, drug control bureaucracies constantly cite the "easy extraction" of cocaine as a reason to continue keeping coca leaves under the strictest schedules of control, while defenders of coca use formulas such as "coca is not cocaine", or "coca is to cocaine what the grape is to wine". A degree of clarity is absent in both these extreme positions. The analogy with wine is particularly inappropriate, since the fermentation of alcohol from naturally occurring plant sugars provides no parallel whatsoever to the extraction of naturally occurring alkaloids from an organic plant source. Simple facts cannot be denied: chemical assays have shown the cocaine content of coca leaves to range between 0.25% and 0.77%.[17] More recent figures used in UNODC's crop monitor survey, and based on the US Justice Department and Drugs Enforcement Administration's (DEA) Operation Breakthrough show a cocaine alkaloid content ranging between 0,52 % and 0,73 %.[18]

This point is rather crucial, as the presence of cocaine in the leaf provides the principal rationale for current attempts by the drug control authorities to maintain coca in Schedule 1, replacing the original arguments regarding the likelihood of coca consumption causing malnutrition or a form of drug dependence. In 1992 the WHO Expert Committee on Drug Dependence undertook a pre-review of the case against the coca leaf to decide whether it should be critically reviewed for rescheduling, but finally ruled against this: "*the coca leaf is appropriately scheduled … since cocaine is readily extractable from the leaf.*"[19] In its first chapter, the 2008 INCB report confirmed this perspective, arguing that the WHO Expert Committee on Drug Dependence had decided against recommending any change of control measures on the grounds of extractability. Literally quoting from the WHO document of 1993 they argue:

"The position of coca leaf in Schedule I of the 1961 Convention is clear: non-medical consumption of the coca leaf without prior extraction of its principal active alkaloids, including cocaine, is prohibited. In 1992, following a request from the government of Bolivia to examine the issue, the WHO Expert Committee on Drug Dependence decided against recommending any change of control measures on the grounds of extractability: "coca leaf is appropriately scheduled... since cocaine is readily extractable from the leaf".[20]

The pre-review stage, however, appears to have been used to prevent a more thorough review of the scientific evidence. This defensiveness on the part of the WHO Expert Committee on Drug Dependence is perhaps understandable: an examination of the original rulings which supported the 1961 Single Convention would show that little or nothing was made of the extractability argument at the time, and the arguments which were then used – coca's links with malnutrition, or its potential to cause addiction – today have limited scientific credibility. In other words, the grounds for maintaining coca leaf in Schedule 1 of the Single Convention have been changed, but – this is the important point – *without* a critical review on the part of the WHO Expert Committee on Drug Dependence. Here, defensiveness verges on dishonesty, and even implies a degree of

[16] Rusby, 1888

[17] Plowman & Rivier, 1983.

[18] DEA, cited in *Drug Availability Estimates in the United States*, Drug Availability Steering Committee, December 2002 (NCJ 197107) http://www.whitehousedrugpolicy.gov/publications/pdf/drugavailability.pdf

[19] WHO Expert Committee on Drug Dependence, Twenty Eight Report, 836, Technical Report Series, Geneva, 1993, p.37

[20] Report of the International Narcotics Control Board for 2008, United Nations Publications, New York, 2009 (E/INCB/2008/1), Chapter 1, p 7.

professional misconduct: the failure to fulfil a scientific role entrusted in good faith to the WHO by the international community.

According to the guidelines for WHO review of psychoactive substances under international control, the Expert Committee must assess each substance in terms of its potential for abuse and its dependence-producing capability; the likelihood of it causing public health and social problems; and its usefulness in medical therapy. On any of these counts, coca leaf would clearly merit a different status to cocaine, and here lies the crucial distinction which current scheduling fails to recognise. According to the mandate of the WHO Expert Committee on Drug Dependence, any substance scheduled in the 1961 Convention must be examined in terms of "*whether the substance has morphine-like, cocaine-like, or cannabis-like effects or is convertible into a scheduled substance having such effects. If so, it then determines, in accordance with Article 3, paragraph 3(iii) of that Convention, if the substance: (1) is liable to similar abuse and productive of similar ill-effects as the substances in Schedule I or Schedule II; or (2) is convertible into a substance already in Schedule I or Schedule II*".[21] The question remains if cocaine production should be classified as a "conversion"; this is perhaps not the correct or exact term, it being merely a matter of concentration/extraction of the cocaine content in the coca leaf. According to the WHO guidelines[22] "*a substance is convertible if it is of such a kind as to make it, by the case of the process and by the yield, practicable and profitable for a clandestine manufacturer to transform the substance in question into controlled drugs*".

Here, defensiveness verges on dishonesty, and even implies a degree of professional misconduct: the failure to fulfil a scientific role entrusted in good faith to the WHO by the international community

There is of course no question about the basic fact that cocaine can be extracted from the coca leaf. The important point, however, is whether this provides sufficient justification for the strict levels of control attached to Schedule 1, and whether alkaloid extraction is actually as easy as present-day authorities would like us to believe. Efficient extraction requires a degree of chemical expertise and a series of elements – alkalis such as cement or calcium carbonate, leaching agents such as boric, sulphuric and hydrochloric acids, and precipitants such as potassium permanganate – which are hardly household staples. And this is only to arrive at a semi-refined coca paste.[23] The conversion of this into cocaine hydrochloride or cocaine free-base ("crack") demands the careful handling of volatile solvents such as ether and acetone, as well as repeated washing, leaching and precipitating of the final product.

Combined with the fact that cocaine extraction is only viable, in practical terms, when favoured by a ready supply of leaves, this explains the current concentration of primary processing in the coca-produc-

[21] WHO/EDM/QSM/2000.5, *Guidelines for the WHO review of dependence-producing psychoactive substances for international control*, Geneva 2000, par. 33, p. 6.

[22] Draft WHO guidelines, proposed revision document, June 2007, page 13, Para 51.

[23] Confusingly, *coca base* is included as a synonym for coca leaf in the 'Yellow List' of synonyms used for substances scheduled under the 1961 Convention, while *coca paste* is included as a synonym for cocaine. *Coca paste* and *coca base* are used to refer to the intermediate products between coca leaf and cocaine hydrochloride. More often in English the terms *coca paste* and *cocaine base* are used to refer to two steps in the process. The *paste*, extracted from the leaves using kerosene, two acids and an alkaline substance, is subsequently precipitated with potassium permanganate, repeatedly washed with a solvent, an acid and an alkali to diminish the presence of other alkaloids and impurities such as kerosene, leading to a more refined *cocaine base* which can have a high level of purity (up to 85% cocaine sulphate). Especially in Colombia the terms have become blurred since more farmers started to sell *cocaine base* instead of *coca paste*. In Bolivia and Peru, it seems, the market of intermediate products is still dominated by *coca paste* and the step to *cocaine base* is usually only made at the same lab where it is transformed into *cocaine hydrochloride*. In Spanish the most commonly used terms are *pasta básica de cocaína* (for *coca paste*), and *base de cocaína* or *pasta lavada* (for *cocaine base*); both can be referred to as *sulfato de cocaína* to distinguish from the end-product *clorhidrato de cocaína*.

ing regions of the world. In order to avoid excessive wastage in the production process, coca leaves must be processed in quantities above 100 kilos, which could yield, at best, approximately 1 kilogram of coca paste, or somewhere in the range 400-700 grams of cocaine hydrochloride. At the prices at which whole sun-dried coca leaves, and semi-processed products such as coca teas and flours, presently retail in the legal consuming markets in the Andes, it simply is not economical to extract alkaloids from these sources. In Lima, for example, coca leaves and coca flour retail at an average of US$ 13 per kilogram – a supply of 100 kilos would therefore cost approximately US$ 1,300. One kilogram of coca paste wholesales locally at between US$ 300 and US$ 600, that is, at between a quarter and a half of the cost of the leaves alone, without considering additional expenditure on chemicals, labour, and 'protection'. In contrast, farm-gate prices for sun-dried coca leaves on the illegal market remained relatively stable in Peru between 2001-2007 at an average of US$ 2.5/kg, according to UNODC figures. In the hypothetical case of coca becoming more widely available world-wide, this margin of economic disincentive would be likely to increase, in line with the expanding transport, storage, taxation, labour and marketing costs of any legal coca trade. Why process crack from tea bags if it ends up costing the consumer several times more than the product already available on the street?

Of course, considerable attention would have to be directed at the logistics and mathematical pricing details of such a supply system. Wholesale prices for illicit cocaine in the principal consuming countries vary a great deal – ranging between US $10,000 and $25,000 in Argentina, Brazil, Venezuela and Mexico, $25,000 and $60,000 in North America, $50,000 and $120,000 in Europe and Asia – and legitimate coca prices would have to reflect this reality, favouring markets closer to the sources of supply. At least initially, controls at the level of importation, packaging and distribution above certain quantities (for example shipments exceeding 100 kg) would probably require a system of stringent fiscalization, including pre-export notifications and end-use certificates, thus preventing diversion in the wholesale trade. There remains, however, the question of any possible extraction of cocaine from products at the retail level, and here a useful comparison could be made with street prices for the refined illicit product.

In Europe, for example, a pure gram of cocaine retails for a minimum of $80 in the Iberian peninsula, to an average of $120 in the central economies, and a maximum of $200 in the relatively small markets to the North and East. Taking the $120 figure, and deducting 25% to account for likely wastage and processing costs, coca products would have to retail in Western Europe at an equivalent of $90 per gram of cocaine content, in order not to undercut the market and make small-scale clandestine processing worthwhile. Allowing for an average 0.5% extraction rate, this would mean that 200g. of coca would have to retail at an equivalent of $90. While this would be rather pricey for tea bags, for instance ($0.45 per 1g. bag), it would be quite reasonable for such a product as coca flour, or prepared mambe/ypadu ($11.25 for a 25g. spice jar). The benefit of this to government finances would be considerable, as something in the range of 80-90% of the final price would be represented by taxation, part of which could be applied to the funding of controls and drug education programmes.

Furthermore, such comparisons are made without considering additional expenditure on chemical precursors, and the need for profits or "mark-up"[24]. Cocaine production would

[24] The mark-up is the economic reward paid to smugglers, wholesalers and retailers of cocaine, for their work. It is presumed to be equal to the sum of the opportunity cost of their time; a premium to offset the risk of legal sanction and their vulnerability to theft and coercion by other illegal actors; monopoly profits that may accrue to established distribution organizations (and the cost they incur to deter potential new arrivals); the cost of other goods and services (such as transportation equipment and storage) which they purchase; and payments they make to evade law enforcement. From Pierre Kopp, "*Political economy of illegal drugs*", London: Routledge. 2004:20. According to a report commissioned by the UK Drug Policy Commission, substantial mark-ups and profit margins have been established as occurring along the supply chain. The report concluded that in the UK there was a mark up of 69% between cocaine entering the UK and the UK street price. See: Tim McSweeney, Paul J. Turnbull and Mike Hough, *Tackling Drug Markets and Distribution Networks in the UK*, Institute for Criminal Policy Research, School of Law, King's College London, July 2008, available at http://www.ukdpc.org.uk/resources/Drug_Markets_Full_Report.pdf

remain a penalised offence, and illegal activities usually only flourish when profit margins are high. The example given here would not leave any such profit margin for the manufacturer or street dealer, and thus price differences and profit margins would in practice have to be significantly greater before any illicit cocaine production based on licit retail coca products is likely to occur. Nevertheless, were unreasonably large retail purchases to be detected by the monitoring system, the introduction of licensing, rationing, and prescribing methods might have to be contemplated. But thought must be given to the fact that excessively stringent controls, or excessively inflated prices, would have the effect of undermining the whole purpose of introducing such products, namely, the re-direction of demand for illicit cocaine towards less harmful natural forms of the drug.

It appears rather obvious, therefore, that the arguments regarding the "easy extraction" of coca alkaloids are not based on any serene analysis of the likelihood of domestic cocaine production across the globe, but rather on the need to perpetuate an ideological framework which justifies the continued prohibition of natural coca products. It is unfortunate that those who would defend the legalization of these products fall into a very similar, if reversed, ideological trap: that of projecting an idea of coca which has absolutely nothing to do with its principal alkaloid, cocaine. *Coca no es cocaína* has become an article of faith in large areas of the Andes, and is often interpreted to mean that coca does not contain cocaine, a substance that only emerges as the result of the corrupt alchemy of Western imperialist scientists with no understanding of coca's traditional role. Various strands of misunderstanding are present here, and they deserve to be disentangled if we are to be able to move forward in our understanding of the plant.

In the first place there is a bit of fine hair-splitting on the part of organic chemists interested in maintaining their monopoly of the definition of coca's molecular structure. Rather than use the common word cocaine – which since its inception has been a form of layman's shorthand, used to describe the principal, crystallisable fraction of the leaf's total alkaloid content – they employ the more technically correct term methyl ester of benzoylecgonine[25], and point to the existence of many other non-crystallisable ecgonines, which are washed out in the illicit transition from coca paste to cocaine hydrochloride, or converted to cocaine proper in more sophisticated laboratories, using the "ecgonine method" first patented by the German company Farbwerke, and used from 1900 onwards by the *Nederlandsche Cocainefabriek* in Amsterdam to process coca leaves from Java.[26] Ecgonine is a scientific term entirely lacking the ideological charge of the word cocaine, and thus the separation between leaf and alkaloid is given a spurious air of scientific legitimacy. This separation, however, collapses when it is pointed out that what is commonly called cocaine is nothing other than a prepared salt (hydrochlorate) of the very same methyl ester of benzoylecgonine.

This is not to deny that the other ecgonines – and a related group of compounds called hygrines – may have a significant role in moderating, altering or expanding the effects of the cocaine contained in the coca leaf. Examinations of the blood of coca and cocaine users, like urine testing, tend to show up ecgonine metabolites – rather than cocaine – which makes it difficult to establish whether a person has smoked crack or drunk coca-leaf tea. Ciuffardi (1948), however, claimed to detect cocaine in the blood of coca chewers, and the undoubted anaesthesia in the mouth produced by coca chewing must be due to absorption of this alkaloid, as Burchard (1975) asserts that ecgonine has absolutely no anaesthetic properties. More research definitely needs to be carried out in this area, as whole plant compounds are clearly more complex in their pharmacology than straightforward single alkaloids. While avoiding a dogmatic position on this issue, current evidence seems to support the view that coca differs from cocaine principally in its rate and route of ingestion, rather than in the observable pharmacological effects of their respective chemical structures. In metaphorical terms, coca chewing produces

[25] Name used in yellow List 1961 Convention

[26] M de Kort 1999: 129

a slow and constant "drip" of alkaloids in the blood stream, which can be maintained for hours without causing irritation. Snorting, smoking or injecting cocaine represent progressively faster "rushes", peaks of stimulation which are followed by physical exhaustion and mental distress. These distinctions clearly require further investigation; what remains as a focus of interest is the way in which the relevant arguments are used to support a radical separation in the nature of the effects of coca and cocaine.

Again, the primacy of an ideological need to distinguish between these two forms of the drug must be understood in its historical context. After a period (roughly 1900-1960) in which it was the rule in official circles to strictly equate coca and cocaine, the advent of the UN Single Convention produced an almost immediate need to correct the balance, at least in serious scientific circles. Picking up where Carlos Monge had left off, the Peruvian neurosurgeon Fernando Cabieses (1946, 1992)[27] defended the metabolic and therapeutic benefits of the traditional use of coca leaf, setting up an Institute of Traditional Medicine within the Ministry of Health in Lima. Based on Montesinos (1965), who first observed the hydrolysis of cocaine into ecgonine in the process of digestion, the American anthropologists Burchard (1975) and Bolton (1976) proposed an "ecgonine model" to explain the effects of coca; in their view, most cocaine was degraded to simpler ecgonines in the chewing process, and thus the impact of stimulation on the central nervous system was greatly diminished. What remained was the broad metabolic assistance which ecgonine affords to the body functions, stabilizing blood glucose levels and correcting the imbalances resulting from a high-carbohydrate diet, and the stress of hypoxia due to living at high altitudes. They were particularly keen to dissociate coca chewers from any subjective experience of what they termed "euphoria", and greatly chastised their students for chewing excessive quantities of coca leaves and reporting that they "got high". Though perhaps understandable in the context of what was then a sudden renaissance in the use of illicit cocaine in the United States, this demonstrated little ethnographic sensibility in grasping indigenous cognitive categories akin to the English word "euphoria", which in Andean cultures may be experienced in quite a different way.[28]

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It is relatively easy, therefore, to identify where the fault lines occur in the discussion concerning the cocaine content in coca leaves. On the one hand there is the traditional Western view, enshrined in the UN Single Convention, which strictly equates coca with cocaine, and treats both in exactly the same way. In contrast, there is a school of thought, which has always stressed the differences between coca and cocaine, and has often – misguidedly, perhaps– sought to identify the crucial distinction in a contrast between an alkaloid and the more complex chemical composition of the leaf. This has led to the extreme position of denying that coca contains any cocaine at all, and seriously undermined attempts to understand the real differences between these two substances: one a single alkaloid with a clear molecular structure, and the other a plant with a complex and still poorly-understood array of mineral nutrients, essential oils, and varied compounds with greater or lesser pharmacological effects, one of which happens to be the alkaloid cocaine.

[27] Fernando Cabieses: '*La acción antifatigante de la cocaína y la habitación a la coca en el Perú*' ; Anales de la Facultad de Medicina, XXIX, 4, P.316-367

[28] See in Henman, 2008: 61-65

In public discussion of these different forms of the drug, it has not often been recognized that the clearly demonstrable, slow assimilation of cocaine through coca chewing actually provides a stronger argument in defence of traditional custom than the scientifically untenable idea that coca contains, or releases into the human organism, absolutely no cocaine at all.

3. COCA AND ADDICTION

The opposing positions on the subject of coca's relation with dependent drug habits arose first in the 1880s, when Sigmund Freud – among others – recommended cocaine as a cure for what had recently been identified as the scourge of "morphinism". Prior to this date, coca had been alternately decried and praised in almost equal measure, as a "foul custom" or a wondrous panacea, but nobody had ever suggested that it caused any form of what today we would call addiction. In a sense, the failure of cocaine to deliver on its promise to cure morphinism led to its being condemned by association, and soon "cocainism" was added to the list of the new chemical dependencies. Thomas Szasz (1975) pointed out that the successive editions of Emil Kraepelin´s classic manual *Psychiatry* only began to incorporate, in the list of "chronic intoxications", cocaine in 1891, adding coca itself finally in 1899. This manual was read by the founding father of Peruvian psychiatry, Hermilio Valdizán (1913), who - from the comfortable distance of Italy, where he was then studying – fired the first modern broadside against the traditional use of coca, denouncing it as a form of "cocainism". In this way ideas that had first been developed to explain opiate habits were transferred uncritically – first to cocaine, and then ultimately to the coca leaf. The most popular early twentieth-century medical manual on the effects of drugs, Louis Lewin's *Phantastica*, thus described the users of coca leaf:

"Physically and morally they behave like opium-smokers. A cachectic state appears, with extreme emaciation accompanied by a gradual change in demeanour. They are old men before they are adult. They are apathetic, useless for all the more serious purposes of life, subject to hallucinations, and solely governed by the one passionate desire for the drug, besides which everything else in life is of inferior value."[29]

Though based on absolutely no first-hand experience, Lewin's authority was such that this view was adopted uncritically by the medical establishment, and particularly by a growing psychiatric profession. This was true even in countries like Peru, which had direct contact with traditional coca users and a respectable literature on the therapeutic uses of coca going back to the founder of modern Peruvian medicine, Hipólito Unanue (1794). By the 1930s a school had emerged in the Lima Faculty of Medicine denouncing what they chose to call *cocaísmo* or *cocamanía,* and – combining this with the malnutrition argument – this group identified an evident and pressing need "*...to free a people from the slavery of an addictive drug.*"[30] It was in order to respond to this initiative that the ECOSOC mission of 1949 disembarked in the Andes, quite confident that its findings would confirm the grave form of drug dependence which the psychiatrists in Lima had already announced to the world. It is a mystery why such a fictitious threat was given such a degree of prominence in the immediate post World War II period, and at a time of an almost complete absence of cocaine on the world illicit market, but this probably had something to do with the competition which coca leaves offered to the American pharmaceutical industry – whose representative, Howard B Fonda, presided over the ECOSOC mission.

In fact, on close examination, the ECOSOC report never concluded unequivocally that coca chewing was a form of addiction at all. The head of the rival Peruvian Commission, Carlos Monge (1952), made this ironic comment on the subject: "*From a medical point of view, there appear to be two irreducible clinical positions: those who believe that coca is a cause of addiction, and those who deny it. A third must be added: that of the members of the UN commission, who maintain that it is not an addiction, but should be treated as such since it is a pernicious habit.*"

[29] Lewin 1924, in Byck 1974:244

[30] Gutiérrez Noriega and Zapata Ortiz, 1947:12

The confusion was obvious to observers at the time, but the absence of scientific backing did not prevent the WHO Expert Committee on Drug Dependence from ruling twice, in 1952 and 1953, that coca chewing should indeed be considered a form of "cocainism". As Cáceres (2007: 48) has pointed out, the ubiquitous Argentine anti-coca campaigner P.O.Wolff played a key role in this development: if in 1949 he had drawn up the plainly biased and incomplete bibliography appended to the ECOSOC report, by 1952 while Chief of the Addiction Producing Drugs Section of the WHO he served as the secretary of the WHO Expert Committee, which had to pass sentence on the coca addiction argument. From a supposedly neutral researcher he had progressed to the position of judging his own thesis – a judgement that, although lacking in even a minimal scientific consensus, formed the basis for coca's inclusion in List 1 of the 1961 Single Convention. [31]

This clearly circular, ethnocentric recycling of negative representations of the coca habit provides a breathtaking example of the ideological functions of bad science, and deserves to be underlined here. First, Europeans who had never witnessed coca chewing declared it to be a form of addiction strictly equivalent to opiate dependence. Next, these declarations were re-edited, with minor alterations, by medical colleagues in Lima who restricted their studies to a dozen prison inmates, an unstated number of "Indians from Huancayo", and copious intravenous injections of cocaine in rats and dogs. Significantly, the principal text on this question[32] contradicts itself in several passages as to whether or not coca really produces addiction, probably due to the fact that the authors never actually observed coca chewing in a natural setting. No matter, their requests for "help" from the international community were generously taken up by a burgeoning narcotics bureaucracy, which then proceeded to cite the studies in Lima as evidence for a theory adopted a priori, "made to measure" for the purposes of coca prohibition.

On this basis, coca – though used by millions without any obvious deleterious effect – was declared a powerfully addictive drug with no known therapeutic or industrial uses, and placed on Schedule 1 of the 1961 UN Single Convention. All without a single field study ever having been carried out among even the smallest population of coca "addicts".

It is therefore understandable that the Andean and Amazonian peoples who use coca feel themselves to have been ignored and even insulted by the international scientific community, as well as humiliated by UN bureaucracies which call on them, in the inimitable language of the Single Convention, to "phase out" what they consider a healthy and ancestral custom. It is also significant that there has been almost no attempt since 1953 to provide serious scientific corroboration for the thesis of coca addiction, for to do so would invite almost certainly a conclusion to the contrary, and thus undermine the entire basis of international coca prohibition. By the 1960s the ideological thrust of anti-coca campaigns had returned to the field of malnutrition (e.g. Buck et al. 1968), where it remains to this day, incorporating as new and supplemental justifications the threat of *narcotráfico,* the environmental cost of coca production, and more recently, the ready extractability of cocaine from natural coca products.

Subsequent researchers have found it very difficult to locate the original 1950 ECOSOC Commission document[33], and the bureaucracy clearly does not want it put under any degree of scientific scrutiny. The unpublished WHO/UNICRI coca and cocaine study of 1992-4[34] finally demolished what remained of the coca-addiction argument, and this may have been one of the reasons why its publication was blocked by the US ambassador at the annual World Health Assembly. In recent years, even studies unsympathetic to traditional coca use – such as the 2004 DEVIDA/INEI survey in Peru – have tended to skirt the issue completely, treating it as a thing of the past and stating unequivocally:

[31] WHO, Technical report Series 57, March 1052, section 6.2, page 10.

[32] Idem; 62-69,129-130

[33] Download at: http://www.ungassondrugs.org/images/stories/cocainquiry-e.pdf

[34] Download at: http://www.tni.org/docs/20070308140927504 6.pdf?

"...it has recently been accepted that the consumption of coca leaves does not affect the health of its users nor produce problems of excessive use or patterns of substance abuse, physiological habituation, moral degradation, behavioural aberration, etc., such as one often observes in the use of illegal drugs."[35]

Thus even those who continue to support the status quo, and would prefer the use of this leaf to be phased out by the broad advance of urban modernity and disdain for primitive custom lay the myth of coca addiction to rest. Modernity, however, has a knack of cutting both ways, and so we find – in the most unlikely settings – a revival of interest in a quite opposite role for coca, now as a treatment for addictions, precisely the aspect that intrigued Freud in the early 1880s. In today's version, the object is not so much opiate dependence, as the types of compulsive consumption that characterize cocaine use, particularly in its smokable forms such as crack and coca paste. This approach was first suggested by Andrew Weil (1978) in a paper on *Coca Leaf as a Therapeutic Agent*, where he recommended its use *"As a substitute stimulant to wean users of amphetamines and cocaine from those drugs, which are more dangerous and have much higher potentials for abuse."*

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The last three decades have seen a degree of preliminary experimentation with this idea, much of it at the level of self-medication. Few would claim that coca is a completely satisfactory substitute for all forms of cocaine consumption, and it certainly is not an instant solution for what health officials describe as the "cocaine problem". Anecdotally, one hears of many ex-users of cocaine who have progressed to the use of various forms of coca leaf, often the easily consumed, powdered preparation known as *mambe* in Spanish and *ypadú* in Brazilian Portuguese – recently introduced to the English language as *e.coca* by the London author and historian Mike Jay. Systematic experimentation by medical doctors has included projects by Theobaldo Llosa (2007) in Lima and by Jorge Hurtado (1997) at the psychiatric hospital in La Paz. Though lacking the panoply of data collection which would allow a solid scientific case to be made for this form of intervention, preliminary results are undoubtedly encouraging and bode well for the future. It may also be that the cocaine-using culture is beginning to move towards less intense, softer or "light" patterns of consuming the drug, as has recently been documented in a doctoral thesis in Brazil by Oswaldo Fernández.[36]

At this point it is important to distinguish between two different versions of the claim of coca as a substitute for cocaine. The first is that exemplified by the practices of Llosa and Hurtado, who use whole coca products – capsules, powders, drinks, and lozenges, even actual leaves – as a form of treatment for various forms of compulsive cocaine consumption. This is unlikely to work in every case, and may take considerable time to become accepted as a complete substitute by the person undergoing treatment. However, it may have an important role to play as a form of intermediate detoxification: allowing compulsive cocaine users to get up and go about their business in day time, while using coca, and limiting the frequency and length of their binges on the refined alkaloid. In this way, coca could serve as a means of gradually reducing cocaine intake, and thus bringing it under a degree of personal control. In the long term, it may also

[35] Rospigliosi 2004:21R

[36] Oswaldo Francisco Ribas Lobos Fernández, doctoral thesis, Federal University of Bahia (UFBA), 2007; "Coca Light?"

lead to the complete substitution of cocaine by less stressful organic coca products.

The second aspect has less to do with individual patterns of consumption, than with a gradual sea change in the whole culture associated with the use of cocaine. As the population which led the renaissance in the use of this drug in the 1970s and 1980s, begins to age, many are either ceasing or severely curtailing their consumption, in a pattern of "maturing out" which was first described in the sociological literature among heroin users in the United States. A similar phenomenon has been documented in the declining consumption curves among cocaine users in Amsterdam (Cohen & Sas 1994) and Barcelona (Diaz 1998). Part of this process could well be hastened and supported by the possibility of replacing cocaine with less abrasive coca products, softer forms of pharmacological delivery, and more delayed, longer-lasting and milder effects.

A flourishing market in natural stimulants, including various coca products, could have a preventive effect in reducing the number of people turning to more concentrated drugs - including the various amphetamines, as well as cocaine itself. Here lies a role for coca which has hardly yet been explored: a progressive, long-term, sustained re-education of the whole cocaine consuming market, away from chemical extracts and back to forms inspired by the model of traditional use. Though only a distant ideal at present, this would be the best tribute which industrial societies could pay to the indigenous South Americans who first domesticated the coca bush.

4. COCA AND THE ENVIRONMENT

As the original arguments supporting coca prohibition – its links with addiction and malnutrition – have receded or been exposed as scientific frauds, so has the international narcotics control bureaucracy been obliged to draw up new justifications for its policies in the producing countries. Principal among these has been the threat of *narcotráfico,* though this begs the question of whether criminalization, rather than the coca leaf, is not itself the leading agent responsible for the present-day impasse. Since at least the 1980s, therefore, there has been a consistent effort – beginning with the US State Department, picked up by the UN drug control agencies, and now championed most vociferously by the Colombian Government – to link the growing of coca with widespread environmental degradation, baptized as "ecocide". The slogan of the campaign currently doing the rounds in the European Union is emblematic: *"Awareness about cocaine's ecocide in Colombia: Shared Responsibility."*[37]

There are a number of observations that are pertinent to the real extent of the "threat" posed by coca cultivation in tropical South America. First of these is that the total deforestation observed for coca production in the last thirty years is very difficult to calculate with any real exactitude. Colombia alone claims to have eradicated over two million hectares of coca in the last ten years[38], but much of this has been repeated fumigation of the same areas – or even, tragically, of vegetation cover which contained no coca at all. Indeed, several alternative development programmes have also been targeted. Exasperated crop-substitution experts struggle perennially with enormous differences in the estimates of total areas dedicated to coca in UNODC and US State Department briefings, knowing that the figures are often blatantly manipulated for political ends (Cabieses 2007). What remains is a realistic, and for that very reason inexact, assumption that current coca plantations, 99.000 hectares in the 2007 UNODC crop survey report[39], have probably involved an accumulated clearing of between one and two million hectares over the last thirty years - a sizable figure for sure, but one which pales to insignificance when compared with the areas dedicated to other tropical crops such as sugar cane, oil palm, soy, maize, bananas, and coffee. None of these are ever subject to the same official opprobrium as coca; despite the fact that many have uses as fuels and indus-

[37] See: http://www.sharedresponsibility.gov.co/en/

[38] http://cipcol.org/images/0904drugwar02.png

[39] Drug control agencies themselves do not even agree: US State Department figures estimated 167.000 hectares of Colombian coca crops for that same year.

trial inputs which have considerably worse downstream environmental consequences than coca. The ongoing debate in Brazil over the use of bio-fuels, for example, concerns not only the huge areas dedicated to sugar cane (around 8 million ha. annually[40]) and oil palm in that country, but also the energy and environmental costs of processing such fuels, and their ultimate negative impact – in terms of heat and toxic residues – on being consumed.

In terms of deforestation of actual primary rainforest, the impact of coca farming has been deliberately exaggerated, with the clear objective of gaining political support for eradication campaigns. Coca is rarely planted in areas of virgin woodland, since this demands a great deal of effort to clear, and leaves stumps and fallen tree-trunks which make harvesting of coca leaves impractical and highly labour intensive. Deforestation figures, not surprisingly, have never been analysed in terms of exactly what type of vegetation has been cleared to plant coca. Verbal reports from farmers in areas as diverse as the department of Cauca in Colombia, the Huallaga, Apurímac, and Urubamba valleys in Peru, and the Yungas and Chapare districts of Bolivia, all describe a preference for clearing regenerating scrublands, which have been allowed to lie fallow since a previous cycle of occupation some two or three decades previously. It is seldom realized that the middle altitude areas that favour coca production are among the territories which have the longest history of human occupation in the Andes. Even when new forest clearing for coca cultivation does occur, it can be seen as a consequence of the irrational policies of forced eradication. This is particularly the case in Colombia, where aerial spraying with herbicides has motivated people to move into newly cleared, more densely planted areas. In Bolivia and Peru, as well, the decision of peasants to move their crops into environmental protection areas could probably have been prevented if their previous plantations had been spared eradication.

Coca agriculture is also best organized in individual family units, rather than in large plantations, and this has the effect of dispersing the plots in small fields which rarely exceed one hectare. This feature has to do with the seasonality of labour in coca harvesting, and the requirement of more hands to pick the leaves at three of four peak moments in the year. Migrant workers are both expensive and undependable for this task, and thus picking is best accomplished by extended family groups who can engage in other activities in between the harvest seasons. Many coca-producing areas also have a tradition of political struggle against large absentee landowners, which by the mid-twentieth century had led to land reforms and a fragmentation of individual holdings. This has meant that coca as a cash crop is usually combined with subsistence agriculture as well, which ensures that most coca is grown in association with other tropical crops, maintaining species diversity in the local flora and fauna, and helping to delay and contain depletion of productive soils. Indeed, on hillsides which may suffer significant surface erosion, farmers view the perennial coca bush – with its wide-spreading, fibrous roots – as a soil-stabilizing plant, which helps in the planting of other companion crops. Its flowers and fruits, not to mention the leaves, also offer sustenance to a range of insects, birds and small mammals, thus enriching the whole cycle of nutrients in the environment.

It is in order to counter such "ecocide" that the Colombian government – generously funded by US, UN and EU bureaucracies – has engaged in alternative development projects whose consequences, in both social and environmental terms, appear considerably more alarming than the problem they were supposedly designed to solve. In the Urubá region of northern Antioquia, for example, the expansion of multinational banana plantations has been achieved by means of the violent expulsion of independent coca farmers, a pattern repeated in many other areas of Colombia. Palm oil, which is used in many foods and increasingly valued as fuel stock for bio-fuels, is often touted as the key to a more sustainable economy for Colombia and a viable alternative to coca for many Colombian farmers. The problem

[40] "Produção de álcool e de açúcar baterá recorde em 2008, prevê Conab" (in Portuguese). Folha de São Paulo. 2008-04-29. http://www1.folha.uol.com.br/folha/dinheiro/ult91u396881.shtml.

with palm oil is that it tends to be produced in areas of extensive monoculture, which provide a poor source of income and food for the resident population, as well as leading to an impoverishment of species diversity in the local flora and fauna. Palm oil also requires industrial processing, which almost always benefits large agro-business concerns, rather than small farmers. It is, in short, a typical plantation crop; the violence, illegal land seizures, and deforestation that have erupted in Colombia as a by-product of the push for more palm-oil production, call into question whether devoting more land to growing this crop is really a sustainable economic or environmental strategy, let alone a decent alternative to coca. [41]

Real costs, however, do accrue to the environment by the increasing use of industrial products in both boosting coca yields and processing coca leaves into coca paste. Chemical fertilizers, herbicides, and various pest-control substances are widely employed to increase productivity, and the impact of these has not been studied properly, or even less, addressed by the programmes that supposedly exist to help coca farmers improve their living standards. Again, an ideological definition prevails over serious scientific inquiry: the "problem" is the production of coca, not the indiscriminate use of the products manufactured by pharmaceutical and agri-business multinationals. A similar perspective is dominant in the discussion over the pollution caused by the sloppy disposal of the chemicals used in coca processing. Somehow the farmers, or those involved in the cocaine extraction process – who have never been given a course in how to avoid such pollution – must be held accountable for makeshift, clandestine facilities which only exist on account of the severe repression which they would not attract if they were better organized and more permanently sited. The fault is the farmers' for wishing to engage in a precursory industrialization of their crop – an aim that is precisely the objective of rural development plans around the world, only vigorously denied to coca producers on account of the illicit nature of the final product. This double standard is particularly galling in view of the fact that mining activities – which have a far greater measurable impact in the pollution of water sources – rarely attract the same levels of official concern.

The point needs to be made, and repeated, that coca eradication campaigns have greatly compounded what could have been a relatively containable phenomenon, forcing coca farmers to relocate, clear new areas, and engage in increasingly predatory agricultural practices. Forced eradication is largely on hold at the moment in Bolivia and southern Peru, due to high levels of political opposition, the election of Evo Morales as Bolivian President, and renewed outbreaks of armed insurgency, particularly in the Ene and Apurímac valleys of Peru. Throughout this area a degree of horse-trading exists over voluntary coca eradication targets, most of which are quite understandably not being met. In Peru, regional governments are being pitched against central government (Cusco, Huánuco, Puno), and different coca growers' organizations in both Peru and Bolivia are being pitched against each other (Yungas, Chapare, VRAE). Though actual violence has decreased substantially from the levels of a decade ago, the political costs of continuing to pay lip service to coca eradication targets is substantial, and may ultimately discredit the current generation of *coquero* leaders. This can only lead to an aggravation of conflict, and a possible return to the policies of forced eradication that caused such mayhem in the past.

Such policies continue to be applied in the Huallaga valley of central Peru, and especially, throughout Colombia, where they have produced unimaginable levels of hardship and violence, as well as internal displacement, social "cleansing", political fragmentation, and land counter-reform. [42] This is not the place to detail all the consequences of the imposition of the US-funded "war on drugs" in these areas, which have been addressed exhaustively in several recent publications (Youngers and Rosin 2005, Soberón 2007). Suffice it to say that both manual eradication and aerial glyphosate spraying have the effect of further displacing coca producers and their crops, leading to

[41] http://www.foodfirst.org/en/node/2051, and: http://www.tni.org/policybriefings/brief28.pdf

[42] Eradications and conflict in Colombia, TNI, May 2008

the colonization and clearing of areas, such as the Pacific coast of Colombia, which only very recently have embarked on coca production. Forced eradication also has the consequence of making agricultural practices more predatory; since quicker yields must be ensured before the eradicators intervene. This leads to excessive stocking of the coca fields, soil depletion, and the need to employ ever-increasing quantities of industrial fertilizers and pesticides. And finally, glyphosate spraying - the backbone of Plan Colombia - has involved the added environmental cost of destroying all the flora surrounding areas of coca production, as well as a series of knock-on effects on human health and the ecological equilibrium generally, not to mention on Colombia's diplomatic relations with its neighbours.[43]

How could an alternative be proposed: one that ensures the survival of coca producers, while at the same time limiting the negative impact on the environment where it grows? As a first step, the decriminalisation of farmers who grow coca as a means to ensure their families´ livelihood would at least open the possibility of dialogue, and allow discussion of the existing practical options. Since Timothy Plowman's (1984) groundbreaking work on the botany of coca, few researchers have seen fit to highlight the ideal conditions under which the different species and varieties of *Erythroxylum* thrive. One supposes that this could be interpreted as being excessively "pro-drug", or at least, as promoting the dependence of peasant farmers on the vagaries of an illicit economy. And yet, in some not too distant future, our society will have to come to terms with the need for coca to occupy its rightful place among the many plants which Andean agriculture has given to the world. At that point, it will be necessary to outline some ideal form of coca cultivation which provides its producers with a decent income, while nevertheless reducing to a minimum the adverse effects which this has on the wider physical and social environment, and trying to reduce the amount diverted to the cocaine industry.

[43] See for example WOLA (2008) *Chemical Reactions: on the Failure of Anti-Drug Fumigation in Colombia*, on deterioriating bi-lateral relations: and, TNI (2007) *The politicization of fumigations Glyphosate on the Colombian-Ecuadorian border.*

Plowman pointed out that the principal economic species, *Erythroxylum coca,* grows best in a rather narrow eco-niche, between 800 and 1800 metres altitude, in areas where both rainfall and temperature averages remain high and almost constant throughout the year. *Erythroxylum novogranatense*, the indigenous coca of highland Colombia, also spans the same altitude and temperature ranges, but is much more tolerant of environmental stress and occasional droughts, which is the reason that it has been favoured by experimental horticulture outside the Andes, and formed the basis of early twentieth-century Dutch plantations in Java. *E. coca* has a variety *ypadú* which is adapted to the conditions of lowland Amazonia, but this yields much less alkaloid and is never likely to be grown extensively, or supply more than a local market. *E. novogranatense* has a variety *truxillense*, which is adapted to the dry conditions in the mid-altitude Peruvian coastal valleys, where it grows under shade and with the benefit of irrigation. The area available to this variety is relatively limited, and again its consumption is likely to remain restricted to a traditional outlets – local coca-leaf chewers and the small market for flavourings, including that used in Coca-Cola.

In terms of serious volume, we are left with the "typical" varieties of *E.coca* and *E. novogranatense*, which can compete with similar alkaloid levels, but have subtly different flavours and ecological needs. The soil requirements of coca are not particularly narrow, though both species show a preference for a rocky substrate of schist, shale, volcanic ashes and limestone. The principal limiting factor is coca's intolerance of low temperatures, which is why it never moved east of the Chapare in Bolivia, where it is protected by mountains from the cold winter *surazo*, which blow up from Patagonia. There is, therefore, a relatively limited range for coca's expansion in tropical America, and - though parts of Africa and Asia undoubtedly share similar characteristics – it is likely that legal production would remain concentrated in what have already been identified as the most favourable sites. Here a form of stable and diversified agriculture, incoporating the best practices of traditional coca-producing areas such as the Yungas of La Paz (Bolivia),

the La Convención and Huallaga valleys (Perú), and the mountains of Cauca and Santa Marta, (Colombia) could offer a future very different from the "ecocide" denounced and perversely promoted by such programmes as Plan Colombia.

5. COCA AND SOCIETY

It is in the social realm that the attitudes surrounding coca sometimes find their most intransigent expressions, with extreme positions underpinned by deeply ingrained cultural prejudice. Many of the early condemnations of the coca habit – from the sixteenth century, through to the campaigns of the 1950s – had a clearly racist or ethnocentric bias. The words of the Peruvian psychiatrists who led the campaign against *cocaismo* are typical in this respect: "…*the use of coca, illiteracy, and a negative attitude to the superior culture, are all closely related*…"[44] It is not surprising, therefore, that the recent revival in nationalist and indigenist sentiment in the Andes has led to a positive re-appraisal of the ancestral use of coca, and the slow diffusion of a better understanding of the plant into new social contexts. In particular, this change of opinion has been expressed in the slogan printed on a million T-shirts: *Coca no es cocaína.*

The objective of this re-evaluation of coca is clearly to distinguish use of the leaf from that of its refined alkaloid, and thus to separate the stereotype of the "drug addict" from the image of the traditional coca chewer. Ambiguously recognized and legitimated in Article 14 of the 1988 Vienna Convention, the question of "traditional use" nevertheless continues to defy any easy definition. Though by far the largest population of coca-leaf consumers remains concentrated among Aymara and Quechua speakers in the Central Andes, there are other indigenous groups – in highland Colombia, and in the Amazon basin – who have quite separate customs of coca use. There cannot, therefore, be any single definition of what constitutes "authentic" traditional practice, and nor – since there are many native peoples who do not use coca – can the banner of coca be pressed into service as a unifying symbol for a continent-wide movement of indigenous peoples.

Ethnic identity and the use of coca do not necessarily coincide, a fact that renders impossible any attempt to limit the legitimacy of traditional use to a strictly indigenous context. In many settings an appreciation of coca has spread over the centuries to the general population, who have created *mestizo* or *criollo* patterns of consumption that are rarely recognized in official discourse as bona fide forms of traditional use. In places these practices are criminalized and actively repressed by the state; perhaps the most emblematic example is provided by the south of the department of Cauca, in Colombia, where coca chewing is still ridiculed in "drug education" programmes, and the small coca farms which provide leaves for the local market are commonly subjected to glyphosate spraying and manual eradication. Here it has become routine to accuse coca producers of using the shield of traditional use to protect the interests of the illicit cocaine industry, an argument that has been deployed with increasing frequency by the authorities elsewhere in the Andes as well.

At the same time, it cannot be denied that farmers have often used the traditional status of the leaf to defend their coca crops against forced eradication, particularly in Bolivia and Peru, while being aware of the fact that most of their harvest probably ends up in the maceration pits for cocaine production. Any formal recognition of coca cultivation for illicit purposes is considered politically incorrect by the growers´ unions, even if the argument of growing the crop for livelihood maintenance is often used in its defence. Both economical and cultural arguments are used to defend growing coca; the simple truth is that although producers would prefer their crop to have an international legal market, the current demand for coca is still predominantly for the elaboration of cocaine.

The banner of traditional use thus attracts a degree of scorn from most international authorities and, in order to provide support for current policies of crop eradication, it has

[44] Gutierrez Noriega and Zapata Ortiz 1947:77

become necessary for the anti-drug bureaucracy to define the traditional use of coca in the narrowest possible terms. Many argue that it is a custom that spread under conditions of colonial exploitation, and is now tending to disappear as the result of the "improvements" in living conditions due to modernization and urbanization. The DEVIDA/INEI study carried out in Peru [45] claimed that a small-scale survival of coca in purely ritual contexts was paralleled by a broader decline in its consumption as a functional stimulant, and thus concluded that real levels of demand were likely to decrease substantially in coming years. In other words, this study saw coca as incompatible with a modern life-style, and reserved for the future a definition of traditional use which verged on the purely folkloric. The clear objectives of DEVIDA, the funding agency, were to support the 1961 Convention's call for a "phasing out" of the coca habit in Peru, and to deny any legitimacy to coca growers and traders in the traditional market.

Rather than disappearing, the use of coca is currently undergoing a renaissance, much of it outside the bounds of what would be considered "traditional" in purist terms

There is a good political reason for current attempts to belittle the importance of any survival in legitimate uses of the coca leaf, and to deny that any expansion in demand is presently under way. In Colombia, the total prohibition of coca in any form (a policy pursued blindly, and with obvious counter-productive effects, since 1947) is being undermined by the growth in a market for teas, flours and other semi-industrialized products. In Peru and Bolivia, the coca leaf is rapidly re-acquiring the status of a potent national symbol, in response to its previous misappropriation and misrepresentation purely as a source of cocaine. No longer an ethnic preserve, coca is being consumed in geographical areas (the Peruvian coast, the Bolivian lowlands) where it had been virtually absent for centuries, and among social groups (students, urban workers, the "alternative" middle class) who, only a generation ago, would have found it unacceptable. In Chile, Paraguay, Ecuador, Venezuela and Brazil – even in Europe and North America[46] - small markets for coca products are emerging, often in semi-clandestine forms which defy the neat division between illicit drug trafficking and normal legitimate commerce. Rather than disappearing, the use of coca is currently undergoing a renaissance, much of it outside the bounds of what would be considered "traditional" in purist terms. This represents a considerable threat to the declared objectives of the UN Conventions, and thus inevitably attracts official condemnation. In its report for 2007, the INCB roundly denounced Bolivia's attempt to protect its market for traditional coca products and requested them to prosecute its use:

"Coca leaf is used in Bolivia and Peru for the manufacture and distribution of mate de coca (coca tea). Such use is also not in line with the provisions of the 1961 Convention. The Board again calls on the Governments of Bolivia and Peru to consider amending their national legislation so as to abolish or prohibit activities that are contrary to the 1961 Convention, such as coca leaf chewing and the manufacture of mate de coca (coca tea) and other products containing coca alkaloids for domestic use and export".[47]

Perhaps the most interesting example of the change in cultural attitudes concerns precisely Bolivia's largest destination for coca-leaf exports, Argentina. Introduced originally in

[45] Rospigliosi 2004

[46] See for example article on booming coca liquor in New York, El Diario, 28 March, 2009: http://www.impre.com/noticias/2009/3/28/furor-por-licor-de-hoja-de-coc-116526-2.html#

[47] Annual report INCB 2007, United Nations, New York, 2008, E/INCB/2007/1

pre-Hispanic times, and further popularised by repeated waves of immigration from the Andes ever since, at some point in the early twentieth century coca crossed the ethnic and class divide and became a custom acceptable to the regional elite in the northern provinces of Salta and Jujuy. Prohibited by the military regime of the 1970s, its subsequent re-legalization was supported by a vote in the national congress - a decision very difficult to overturn, as any return to the policies of the dictatorship would today be almost impossible to sustain. Thus, from being originally an element of an alien Andean identity, in Argentina coca has become a mark of regional pride, now entirely removed from its original indigenous roots. This evolution demonstrates, if further evidence were needed, how ineffectual the UN conventions have been in eliminating the consumption of coca leaf in South America, and how unrealistic it is for the INCB to continue insisting that only "medical and scientific" uses for coca should be allowed by member states. It also underscores the need to define "traditional use" not in ethnic or even geographical terms, but rather as any use of the coca leaf in forms not subject to chemical manipulation.

A particularly good illustration of this - as the INCB tacitly acknowledged in the 2007 report - is the use of coca leaf as a tea, something that has long been acceptable in the Andes as a cure for *soroche,* or altitude sickness. Pope Paul VI, the Queen of Spain, Princess Anne of the United Kingdom: these and many other authorities, including even sundry functionaries of the United Nations and the US State Department, have enthusiastically sipped on the coca tea offered on arrival at the 4000-meter altitude of La Paz airport. The INCB, in its 1994 supplement[48], admitted that one of the ambiguities surrounding the coca issue was the drinking of coca tea "*which is considered harmless and legal in several countries in South America, (but) is an illegal activity under the provisions of both the 1961 Convention and the 1988 Convention,* ***though that was not the intention of the plenipotentiary conferences that adopted those conventions***" (emphasis added). It even admitted that this was an area "*where clarifications are needed*" with the Board "*confident that the Commission on Narcotic Drugs, on the basis of scientific evaluation, will resolve such long-standing ambiguities, which have been undermining the conventions.*" Here the absurdities of coca prohibition could not be more clearly exposed: an herbal tea acceptable to the great and the good remains, in a strictly legal interpretation of the 1961 Single Convention, a powerfully addictive drug with no known therapeutic or industrial uses.

FINAL REMARKS

International legislation on the coca leaf appears locked into a series of misunderstandings, which have deep historical roots, including racial and cultural intolerance, the arrogance of the psychiatric profession, and a one-sided definition of the world's "drug problem" by developed countries. It is hardly surprising if a long-delayed reaction to the current legal formula sometimes stakes out a position in excessively emphatic or simplistic forms (*coca sí, cocaína no*). At no point in the establishment of the current regime were the views of traditional coca users taken into account, despite the fact that they numbered millions of otherwise law-abiding, healthy and productive citizens. Their social practices and ethical values were of no account in the corridors of power, where cultural "cleansing" was dressed up in the language of redemption, of liberation from a dangerous form of drug dependence. Thus did the twentieth century Western powers re-edit their unfinished business of conquering America – not just its peoples and resources, but even its customs and consumption patterns. As an increasingly vociferous defence of the coca leaf gathers pace, a degree of humble recognition of past mistakes may yet mark a return to humane tolerance, the true spirit of scientific endeavour, and a welcome reconciliation between peoples marked by a history of conflict.

[48] http://www.incb.org/pdf/e/ar/incb_report_1994_1.pdf, p.4

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History has been unjust to the coca leaf, denying it distribution on a global scale despite its proven value as an energy enhancer, while limiting its potential for widespread use as a healthy alternative to all sorts of chemical stimulants currently available on the world market.

The inclusion of the coca leaf in the 1961 Single Convention's lists of drugs liable to abuse, and therefore subject to international control, has not produced the effect originally desired: traditional use - whether by chewing the leaves or drinking them in an infusion - is still widespread, though largely limited to a few countries where such practices have historical antecedents. Potential demand is high, particularly for coca tea. The ban of even this innocuous custom is still one of the demands repeated annually in the statements of the INCB, the interpretive body of the UN control system. This unreasonable posture has recently led to a formal request from one government to abrogate the articles of the 1961 Convention that demand abolishing of coca leaf chewing.

The present issue of Drugs & Conflict intends to debunk and disentangle the most prominent myths surrounding the coca leaf. It aims to clear the air and help steer the debate towards a more evidence-based judgement of the issues. Discussion has been stuck for too long at the point where it is now, and - sometime in the near future - political decisions will need to be made on coca's fate and legal status.

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Founded in 1974, TNI is an international network of activists and researchers committed to critically analysing current and future global problems. Its goal is to provide intellectual support to grassroots movements concerned about creating a more democratic, equitable and sustainable world.

Since 1996, TNI's Drugs and Democracy Programme has been analysing trends in the illegal drug economy and global drug policy, causes and effects on the economy, peace and democracy.

The programme does field research, fosters political debate, provides information to officials and journalists, coordinates international campaigns and conferences, produces analytical articles and documents, and maintains an electronic information service on the topic.

The goal of the programme and the Drugs and Conflict series is to encourage a re-evaluation of current policies and advocate policies based on the principles of harm reduction, fair trade, development, democracy, human rights, protection of health and the environment, and conflict prevention.