

<b>William Burroughs: Sailor of the Soul.</b>
---

**A.J. Lees**

**Reta Lila Weston Institute of Neurological Sciences, Institute of Neurology,  
University College London WC1 ([andrew.lees@ucl.ac.uk](mailto:andrew.lees@ucl.ac.uk)).**

**Abstract**

**In 1953 William Seward Burroughs made several important and largely unrecognised discoveries relating to the composition and clinical pharmacological effects of the hallucinogenic plant potion known as *yagé* or *ayahuasca*. Illustrations of Burroughs' voucher sample of *Psychotria viridis* and his letter to the father of modern ethnobotany Richard Evans Schultes are published here for the very first time.**

**Introduction.**

William Seward Burroughs (1914-1997) demonised by post-War American society eventually came to be regarded by many notable critics as one of the finest writers of the twentieth century. In my article entitled *Hanging around with the Molecules* and my book *Mentored by a Madman; The William Burroughs Experiment* I have described how as a young medical student I forged a Mephistolean pact with ‘the hard man of hip’ that allowed me to continue my medical studies. Many years later Burroughs was behind my determination to resurrect apomorphine for the treatment

of Parkinson's disease (Stibe, Lees, and Stern 1987) and employ the Dreamachine to better understand the neurobiology of visual hallucinations. *Junkie* helped me understand the dopamine dysregulation syndrome, far better than any learned paper. My patients craved, then wanted but never enjoyed their anti-Parkinsonian medication (Giovannoni et al. 2000). After reading the Yage Letters in 1978 I also came to see William Burroughs as a shady traveller in the grand tradition of the Victorian naturalists.

In this article I reveal how his ethnobotanising in the Colombian and Peruvian Amazon contributed an important and largely unrecognised footnote to the unraveling of the phytochemistry of ayahuasca (yagé).

### **'The Final Fix'.**

In 1950 William Burroughs' read an article in a popular science magazine at Grand Central Station that claimed that the medicine men of the Amazon and the Andean foothills used a decoction to foresee the future and communicate with the spirits of their ancestors. The story captured his interest and through further research in the New York Public Library he learned that Richard Spruce had identified the active ingredient in the shaman's potion in 1851 as a fast growing liana with a thick double helical stem that belonged to the tropical family of flowering

plants known as the Malpighiaceae. Spruce sent voucher samples of the vine back to the Royal Botanical Gardens in Kew where they were confirmed as a new species by the systematic botanist George Bentham and given the name *Banisteria caapi*. (Spruce and Wallace 1908)

In the northwestern Amazon of Brazil and Colombia the vine was referred to mainly as caapi or jagube, in Peru and Bolivia it was called ayahuasca and along the eastern foothills of the Andes in Colombia and Ecuador as yagé. He also learned that the substance responsible for the mind-bending effects of the plant present in its stems was a beta carboline called harmine. What disappointed him, however, was the lack of narrative accounts relating to its magical properties. In frustration he wrote to his former hypnotherapist Dr Lewis Wolberg who informed him that yagé was ‘under wraps’ because the US Army were conducting secret experiments.

Despite his lack of experience in botanical fieldwork, Burroughs embarked on his first serious attempt ‘to dig yagé’ in 1953. He told acquaintances that South America was the final chance to ‘change fact’ and that he was determined to get back among the Indians. He may also have hoped that *la planta maravillosa* would exorcise the ‘Ugly Spirit’ that had led him to shoot dead the mother of his son, Joan Vollmer in Mexico City. Before setting off he had written conspiratorially to Allen Ginsberg, ‘I think the deal is top secret. I know the Russians are working on it, and I think U.S. also. Russians trying to produce “automatic obedience” have

imported vast quantities of Yage for experiments on slave labor' (Burroughs 2006).

On his arrival in the Colombian capital Burroughs took a tram to the *Instituto de Ciencias Naturales* of the *Universidad Nacional de Colombia* where he had the good fortune to bump into Doctor Richard Evans Schultes. Schultes was an ethnobotanist who had graduated from Harvard University a year after Burroughs . Schultes was officially employed by the US Department of Agriculture to survey rubber production in the Amazon but as a result of his close collaboration with plant chemists in Boston he had succeeded in revealing the medicinal secrets of at least two hundred indigenous plants. Schultes pulled out a dry, wrinkled piece of caapi stem and told Burroughs that under its influence he had experienced hazy blue and grey colours.

Schultes recommended that if Burroughs wanted to have an authentic experience he should leave Bogotá and travel to Puerto Asis. During the ensuing 5 week solo trip Burroughs was mugged, contracted malaria and witnessed first-hand the civil war that was raging in the countryside (*La Violencia*). He also had his first half-baked yagé trip (Burroughs 2006):

*That night I had a vivid dream in color of the green jungle and a red sunset  
[...] Also a composite city familiar to me but I could not quite place it. Part  
New York, part Mexico City and part Lima, which I had not seen at this time.*

Schultes was still in Bogotá when Burroughs returned from his disastrous journey and offered him the opportunity to accompany a group of British and Colombian scientists

who were about to set off for the rainforest to investigate a blight that was killing the cocoa trees. During the long journey through the forests of the Putumayo Schultes informed Burroughs that the Indians saw the caapi stem as a cord that connected them to their mythical past. In order to communicate with their invisible world in the Milky Way they needed to travel from one cosmic plane to another.

. In the municipality of Mocoa, Burroughs was introduced by a German rancher called Fürbringer to a medicine man. Burroughs arrived in the early evening at the shaman's shack. The Indian took a drink from a bowl and poured some of the dark oily liquid into a dirty red plastic cup. Burroughs drank the bitter brew and within two minutes was overcome by severe nausea and vertigo. He then saw some blue flashes, and the hut took on a far-Pacific look with Easter Island heads. Burroughs feared he was going to have a seizure and took Nembutal. At dawn he was well enough to walk back down the mountainside to the Hotel America. He told members of the expedition that he considered the Ingano medicine man to be a deceitful charlatan who specialised in bumping off gringos.

Schultes informed Burroughs that the Indians of the Putumayo crushed the vine with a rock and sometimes mixed it with leaves from other plants, whereas on the upper Uaupés, close to the Brazilian border, where Spruce had first imbibed caapi, the Tukano Indians scraped shavings from the *Banisteria* bark and allowed it to mull for several hours in cold water before its final concentration by simmering.

On his return to Bogotá Burroughs continued his investigations of yagé in a run-down laboratory at the *Instituto de Ciencias Naturales* with the intention of isolating the active alkaloids from the nauseating resin. The University had provided him with a published extraction method but the brown feathery residue caused only sedation and was disappointingly devoid of hallucinatory effect.

Burroughs' concluded that the dry vine was completely inert and that harmine tinctures were a pale replica of yagé, devoid of an as yet unidentified vital volatile element.

He then travelled to Peru via Ecuador and in Pucallpa on the banks of the Rio Ucayali Burroughs was introduced to the local *doctorito*, a young man named Saboya who poured yagé out of a beer bottle into a cup and whistled over it. After Burroughs had drunk from the cup, a blue substance invaded his body, his jaw clamped tight and he developed convulsive tremors of the limbs. Saboya told Burroughs, 'I have no enemies, I turn them all into friends.' Saboya went on to tell him that yagé helped to correct any disharmony the Indian felt with the forest. In his universal womb the visible and invisible become of equal authenticity and when he crosses back to conscious unreality the Indian incorporates the shapes and patterns of his visions into the forest world.

From Hotel Pucallpa he scribbled off a letter in pencil to Ginsberg asking him not to send off the article he had written about yagé in which he had stated that only the fresh liana could induce hallucinations:

*Hold the presses! Everything I wrote about Yage subject to revision in the light of subsequent experience. It is not like weed, nor anything else I have ever experienced. I am now prepared to believe the Brujos do have secrets, and that Yage alone is quite different from Yage prepared with the leaves and plants the Brujos add to it.*

Burroughs experiences with yagé in the Peruvian Amazon were far more intense than anything he had experienced in Colombia. His self-experimentation at a time

when very few travellers in the forest had experienced yagé allowed him to provide further detail of its effects

*It is the most powerful drug I have ever experienced. That is it produces the most complete derangement of the senses. You see everything from a special hallucinated viewpoint. If I was a painter I could paint it.*

In a further letter to Allen Ginsberg posted from Lima on July 8 1953 he wrote:

*Like I say it is like nothing else. This is not the chemical lift of C (sic cocaine), the sexless horribly sane stasis of junk, the vegetable nightmare of peyote, or the humorous silliness of weed. This is an instant overwhelming rape of the senses.*

. After several more ceremonies Saboya eventually agreed to divulge to Burroughs his trade secrets :

*He mashes pieces of the fresh cut vine and boils two hours with the leaves of another plant tentatively identified by a Peruvian botanist as Palicourea Species Rubiaceae. The effect of Yage, prepared in this manner is qualitatively different from cold-water infusion of Yage alone, or Yage cooked alone. The other leaf is essential to realize the full effect of the drug. Whether it is itself active, or merely serves as a catalysing agent, I do not know. This matter needs the attention of a chemist*

Burroughs bought several bottles of the potion for his private use and observed that after repeated self-administration, tolerance to the sickness and vomiting occurred

whereas in contrast sensitisation to the psychic effects developed. Through the power of yagé he had glimpsed a powerful force that had provided him with a gateway into his proximate closed-off past. Daily living was an illusion or a dream, and if he were to free himself from the dementia of Middle America he would need to stop questioning, and abandon rational explanation. Mechanical acquisition of facts was a waste of time. Yagé had put him into contact with discarnate entities and provided him with a ladder to the Magical Universe. It permanently changed his metabolism and in so doing altered the constant scanning pattern of his former reality.

He later admitted that despite his fear of hallucinogens Yagé had been more effective in straightening him out than a hundred hours of psychoanalysis. It had modified consciousness, scrambled his senses and disrupted space and time. It had allowed him to leave behind “the entire structure of pragmatic, result-seeking, use-seeking, question-asking Western thought.

. On his return from Peru Burroughs tried to remain in contact with Schultes. In December 1954 Burroughs posted Schultes a Christmas card and a voucher specimen of the plant that enhanced the effects of *Banisteria*. The accompanying typed letter began:

Dear Dick

I enclose sample of leaves used in preparation of Yage-Ayauska (*sic*) there-by Peru Indians. They boil the macerated vine with a large portion of these leaves for two hours. Yage prepared in this way is a great deal more powerful and quite different in effect from Yage prepared in the same manner alone or from a cold infusion....



**Figure 1 Insert Burroughs letter to Schultes here.**

Burroughs goes on to say in the letter that the voucher sample was collected from a two feet high bush in the locality of Pucallpa. He speculates that the leaves might contain an active drug or work as a catalyst or extractor, and asks Schultes if the plant might be the same as the one they had been shown together on Herr Fürbringer's ranch near Mocoa. He also apologises for the poor quality of the macerated specimen. In concluding he asks Schultes to reply to him and enquires whether the photographs taken of them together in Bogotá were available to view, signing off, 'As ever Bill Burroughs' (See Figure 1).

In January 1955 Burroughs wrote once more to Ginsberg this time from Tangier about his disappointment that Schultes had never replied to his letter. After more than a decade of travel in the Colombian Amazon Schultes had returned to Boston to curate the orchid herbarium in Boston.

In 'Letter from a Master Addict to Dangerous Drugs' published in the *British Journal of Addiction*, Burroughs wrote:

*About five pieces of vine each eight inches long are needed for one person.*

*The vine is crushed and boiled for two or more hours with the leaves of a bush identified as *Palicourea* sp. *Rubiaceae* (Burroughs 1956).*

He was now persuaded that each plant had its own musical score and each *vegetalista* composed his own symphony.

**Figure 2 Insert photograph of Burroughs previously unpublished voucher specimen of *Psychotria. viridis* here**

Years later after Burroughs had become a countercultural avatar Schultes (Doc Schindler in the Yage Letters) joked to his younger colleagues that if he had known what Burroughs would end up writing he would have left him in the jungle. He also related to his student Wade Davis an amusing incident in which Burroughs had poured some ink out of the porthole of a shining Colombian naval vessel much to the dismay of the captain and the crew (personal communication Wade Davis). In *One River; Explorations and discoveries in the Amazon Rain Forest*, Davis now a Canadian ethnobotanist, anthropologist and photographer brings the expeditions of his mentor Schultes vividly to life.

In 1958, Sidney Udenfriend a scientist working at the National Institutes of Health, Bethesda, Maryland showed that harmine was a reversible monoamine oxidase inhibitor (Udenfriend 1958) Monoamine oxidase was the enzyme that degraded the chemical messengers serotonin, noradrenaline and dopamine after they had been released from nerve endings into the synaptic cleft. . Drugs that inhibit monoamine oxidase like harmine became a popular class of anti-depressants in the nineteen fifties and sixties but because of their potential to induce life-threatening 'cheese effects' had fallen out of fashion by the time I read *Naked Lunch* in 1969.

## **Prestonia**

Throughout the first half of the twentieth century sloppy misinterpretation of the writings of Richard Spruce led to considerable confusion in the ethnobotanical literature. In his diaries Spruce had noted that the Tukanos on the Rio Negro sometimes mixed an apocyanaceous twiner whose leaves were of ‘ a shining green, painted with strong blood-red veins with the *Banisteria* vine. Spruce was unsure whether this second plant called by the Indians *caapi-pinema* contributed to the narcotic effects of the shaman’s brew.. He was unable to collect specimens to send back to Kew for identification but from the shoots the Tukanos showed him he raised the possibility that it might be the same plant he had identified by the Lago do Quiriquiry, 1200 miles away in the Brazilian state of Pará which had been provisionally classified as *Haemadictyon amazonicum* and later listed as *Prestonia amazonicum* (Spruce 1873).

During his travels up the Rio Uaupés in 1903-1905 Theodor Koch-Grünberg, the German ethnologist stated that the Tukanos knew two kinds of caapi but like Spruce he was only able to identify *Banisteria*(Koch-Grunberg 1909).

The French anthropologist Reinberg added further to the uncertainty when he stated that according to tribes living close to the river Curaray in Peru, ayahuasca and yagé were different and that yagé might be derived from *Prestonia* or a related genus .(Reinberg 1921).

Writing in the *British Journal of Inebriety* in 1929 one of my teachers Macdonald Critchley, then a young neurologist at the National Hospital, Queen Square, London reviewed the sparse literature and claimed that yagé was derived from a climbing shrub *Haemadictyon amazonicum* that was employed in the form of a yellowish-red decoction, which in common with quinine had a bluish tint

when viewed from certain angles. Yagé could provoke Lilliputian and Brobdingnagian hallucinations and curious haptic delusions. In contrast *Banisteria caapi* frequently induced blue geometric shapes and complex illusions featuring big cats and giant serpents (Critchley 1929).

Uncritical acceptance of Reinberg's suggestion that ayahuasca and yagé were different had muddled the literature although most authorities continued to emphasise the primary role of *Banisteriopsis caapi*

Further vindication for the 'splitters' seemed to have occurred in 1958 when two American chemists F.A. Hochstein and Anita Paradies reported that *Prestonia Amazonicum* contained the indole alkaloid, N, N-dimethyltryptamine. However, in an article entitled *Prestonia; an Amazon Narcotic or Not?* published in 1960 in the *Botanical Museum Leaflets of Harvard University* Richard Schultes and the plant chemist Robert Raffauf noted that Hochstein and Paradies had been supplied with an aqueous extraction of leaves by a private collector from a locality near Iquitos and that no voucher samples had been kept to confirm the plant's identity. In Schultes' opinion there was no support for the assumption that any species of *Prestonia*, least of all *Prestonia amazonicum* was the prime ingredient of yagé and that serious doubt must remain as to whether N, N-dimethyltryptamine occurred at all in this group of plants.

No mention of Burroughs voucher specimen was made in their article but they emphasised that it was likely that the shamans added a number of as yet unidentified plants to their brews to create special effects (Schultes and Raffauf 1960). *Prestonia amazonicum* is now considered a rare and local species favouring watery habitats and unlikely to be a common or vital component of yagé.

## **Fractal Elves.**

Burroughs' experience with yagé in Peru set him off on a decade of experimentation with psychoactive molecules. He surmised that if the crude plant extract had such powerful hallucinating effects probably even more spectacular results could be obtained with synthetic variations.

Although Burroughs frequently warned the world of the potential risks of peyote and yagé (Burroughs 1956) he continued to 'put out his vine' to scientists involved in the design and study of new hallucinogens and conceded that it may have had a positive effect on his art.

In 1960 Burroughs transferred from the Beat Hotel in Paris to the urban jungle of Earls Court, London's bed-sit land

and renewed acquaintance with an inorganic chemist called Dennis Evans who worked at Imperial College on the magnetic properties of molecules in solution. Evans rarely arrived at his laboratory before midday but the originality of his work in physical chemistry was recognised by his election as a Fellow of the Royal Society, the most prestigious accolade that can be bestowed on British scientists.

Evans was also an expert on hallucinogenic molecules and occasionally gave public lectures at Imperial on the topic. . Like Burroughs he was a solitary bohemian and his ability to synthesise dimethyltryptamine (DMT) and other mind-altering molecules gave him cachet in the artistic circles he loved to frequent. Some evenings Burroughs would spend the evening drinking with Evans at the

Chelsea Arts Club and then accompany him to his South Kensington laboratory where the two men would design psychedelic drugs.

. . . On April 8 1961 Burroughs informed his 'cut up' ally Brion Gysin that in contrast to *yagé* the effects of DMT were intense and lasted less than half an hour. There was none of the nausea, burning in the stomach and paraesthesiae he had experienced with the vine of the soul but the molecule took him to a terrifying place and possessed a phantasmagorical intensity He described 'an all out tangle with the Green Octopus', a 'pin ball machine world' containing 'creatures of the oven with metal mouths dripping purple fire' and 'souls torn into arthropod fragments by the Iron Claws of chess masters.'

Colour had been prominent in Burroughs' writing since 1953 but after the shifts and displacements of *Prestonia* as he called DMT it became a tool to expose the habits of language. Burroughs also used his *Prestonia* experience to devise exercises such as the colour line walks:

Try this when you walk down any street. Pick out all the blue objects in your field of vision. Now pick out all the red objects. Now shift back and forth You can paint as you walk.. . You can make every walk a painting. Look at the street signs. Cut in your own thoughts. Snatch bits of conversation as you pass. You can write as you walk. You can make every walk a story.

In 'Comments on the Night Before Thinking' published in *Evergreen Review* in the September-October issue of 1961 Burroughs related the horrifying effects of a *Prestonia* overdose that he had tried to combat by the use of apomorphine sublingual pellets.

I took ten twentieth grain tablets and lay down and flashed a glimmer of grey beyond the ovens and made it out to the silver tea pot in the Port Tea Room - Puked in the bidet - saw the battlefields of interplanetary war torn envelopes and screaming flesh under heat blast from the tower - fading now (Burroughs 1961).

Burroughs terrifying visceral descriptions of pain and heat suggest that the effects of DMT were not confined to the visual system:

Some far out experiences with that awful *Prestonia*. Strictly the Nightmare Hallucinogen. Trip to the Ovens like white hot bees through your flesh and bones and everything but I was only in the ovens for thirty seconds.

His earlier assertion that ‘my work and understanding has gained *measurably* from the use of hallucinogens’ was now under self-scrutiny. Larger doses of DMT had propelled him into decidedly unfriendly waters. He wrote to Gysin ‘for Allah’s sake Brion be careful of that fucking *Prestonia*. Personally I would not take it again.’

Burroughs letters in the early sixties attest to his continuing interest in hallucinogens and describe his experiences with psilocybin, mescaline, LSD 6 and LSD 25 and dimethyltryptamine. The ethnobotanist Terence McKenna much later described the diminutive human forms frequently reported under DMT as ‘fractal elves’.

## **The Summer of Love**

In 1967 thirteen years after Schultes had severed contact with Burroughs, The United States Department of Health, Education and Welfare organized a symposium in San Francisco entitled *Ethnopharmacologic Search for Psychoactive Drugs*. At the meeting Schultes informed the scientific world that the strongest yagé fireworks occur when the bark of *Banisteriopsis caapi* is mixed with the leaves of the perennial shrub, *Psychotria viridis* (*chacrana* or *chacrona*) a popular admixture used by the Kofán tribes of Ecuador and Colombia (Efron, Holmstedt, and Kline 1979).

A year after the San Francisco conference, Schultes visited the Royal Botanical Gardens at Kew and analysed Richard Spruce's nineteenth century voucher samples of caapi and reported that even after more than a century of preservation the stems of *Banisteria* still contained a substantial quantity of harmine (Schultes 1969).. In the same article with a gentleman scientist's unselfish generosity Richard Schultes also briefly acknowledged William Burroughs' trailblazing contribution to ethnobotany.

*The utilisation of Psychotria viridis was first reported in 1967, but an earlier herbarium collection had indicated its use as an additive with b.caapi (William Burroughs s.n.).*

Schultes had tentatively labelled Burroughs' specimen as *Palicourea fastigiata* in the Rubiaceae family and stored it safely in the Harvard herbarium but he had not had the opportunity or inclination to follow up on Burroughs' discovery In 1973 Burroughs' one and only voucher specimen was reclassified as *Psychotria viridis* by Timothy Plowman. (see Figure 2)



## **Pharmahuasca**

The Canadian chemist Richard Manske first synthesised N, -N dimethyltryptamine (DMT) in 1931 during the surge of psychopharmacological investigation that followed the isolation of mescaline from the peyote cactus. Although several tryptamines were known to be present in considerable quantities in the plants (*chacrana* shrub and *oco-yaje* vine (*Diplopterys Cabrerana*) known to be used in the preparation of yagé DMT was known to be inactive when administered by mouth.

One of the functions of the enzyme monoamine oxidase is to protect the human organism against potentially toxic exogenous amines like tyramine that are degraded in the intestine. A year after Schultes' presentation in San Francisco led Stig Agurell, Bo Holmstedt and Jan-Erik Lindgren suggested that the monoamine oxidase inhibitor, harmine present in *Banisteriopsis caapi* might permit dimethyltryptamine absorption by blocking its degradation (Agurell et al. 1968). In 1978 Jeremy Bigwood confirmed that DMT was active by mouth in doses of 100mg when combined with a small dose of harmine (Bigwood and Ott 1977) and these findings were confirmed and expanded by Jonathan Ott's self experimentation in the 1990s with 'pharmahuasca' (Ott 1999). Stimulation of the 5-hydroxytryptamine (serotonin) 2A receptors by DMT is now believed to be the principal mechanism underlying the psychotomimetic effects of yagé.

## **Altamirage**

The Indians maintain that their magical formulae have been passed down

by mouth from their extra-terrestrial ancestors and owes nothing to blind luck or even trial and error. Burroughs was a human guinea pig who in the noble tradition of the great neurologists Jean-Martin Charcot, Silas Weir Mitchell and Macdonald Critchley sacrificed his brain for strictly controlled self-experimentation. After his yagé experiences his writing changed from the hard-boiled narrative of *Junkie* to the non-linear stream of consciousness in *Naked Lunch* .

Burroughs was ‘the third’ that walked beside me revealing divine secrets and unnoticed features. He encouraged me to break down arbitrary barriers between science and art and to question established fact. In his world the ether held forth promise reflected in shimmering pools.

### **Legend for figures.**

**Figure 1.** Letter written by William Burroughs to Richard Schultes from Palm Beach, Florida after his return from Peru.

**Figure 2.** The voucher specimen sent by Burroughs to Richard Schultes and belatedly identified by Tim Plowman, one of Schultes’s protégés in 1973.

### **Acknowledgements**

Oliver Harris in his introduction to Yage Letters Redux inspired this investigation and Wade Davis confirmed Burroughs unlikely precedence in the ethnobotanical annals of yagé. Both were supportive of this essay.

I am grateful to the Economic Herbarium of Oakes Ames of Harvard University, Cambridge, Massachusetts, USA for permission to publish the letter from William Burroughs to Richard Schultes and a photograph of Burroughs' voucher specimen of the leaves of *Psychotria viridis*. I would also like to thank Michaela Schull, Director of Collections and her staff at the Harvard University Herbaria for their assistance without which the originality of this publication would be negligible.

## **Selected Bibliography**

### **Major Reference Sources**

The Yage Letters Redux by William S. Burroughs (Author), Allen Ginsberg (Author) and Oliver Harris (Introduction) Penguin books London (2006)

One River: Explorations and discoveries in the Amazon Rain Forest by Wade Davis, Simon and Schuster, New York (1996)

The Letters of William S. Burroughs (194-5-1959) Edited by Oliver Harris. Picador. London (1993)

Rub Out the Words. The Letters of William S. Burroughs 1959-1974. Penguin books London 2012.

Hanging out with the Molecules by Andrew Lees, Dublin Review of Books

September 1 2014 Issue 59 <http://www.drb.ie/essays/hanging-out-with-the-molecules>

Mentored by a Madman; The William Burroughs Experiment by A.J. Lees. Notting

Hill Editions, UK. 2016 and New York Review of Books, 2017.

## References

- Agurell, S., B. Holmstedt, J. E. Lindgren, and R. E. Schultes. 1968. "Identification of two new beta-carboline alkaloids in South American hallucinogenic plants." *Biochem Pharmacol* 17 (12):2487-8.
- Bigwood, J., and J. Ott. 1977. "DMT: The fifteen minute trip." *Head* 11:56.
- Burroughs, W 1956. "Letter From a Master Addict to Dangerous Drugs." *The British Journal of Addiction* 53 (2):119-131.
- Burroughs, W.S. 1961. "Comments on the Night Before Thinking." *Evergreen Review* 5 (20):31-36.
- Burroughs, William S. 2006. *The yage letters redux*. 4th ed. San Francisco: City Lights Books.
- Critchley, Macdonald. 1929. "The Ayahuasca and Jage Cult." *British Journal of Inebriety (Alcoholism and Drug Addiction)* (4):218-222.
- Efron, Daniel H., B. Holmstedt, and Nathan S. Kline. 1979. *Ethnopharmacologic search for psychoactive drugs*. New York: Raven Press.
- Giovannoni, G., J. D. O'Sullivan, K. Turner, A. J. Manson, and A. J. Lees. 2000. "Hedonistic homeostatic dysregulation in patients with Parkinson's disease on dopamine replacement therapies." *J Neurol Neurosurg Psychiatry* 68 (4):423-8.
- Koch-Grunberg, T. 1909. *Zwei Jahre unter den Indianern; Reisen in Nordwest-Brasilien*. 2 vols. Vol. 1. Cambridge, UK: Cambridge University Press.
- Ott, J. 1999. "Pharmahuasca: human pharmacology of oral DMT plus harmine." *J Psychoactive Drugs* 31 (2):171-7. doi: 10.1080/02791072.1999.10471741.
- Reinberg, P. 1921. "Contribution à l'étude des boissons toxiques des indiens du Nord-ouest de l'Amazone, l'ayahuasca, le yajé, le huanto." *J. Soc. Améric. Paris* 13:25-54, 197-216.
- Schultes, R. E., Holmstedt, B. & Lindgren, J. E. . 1969. "De Plantis Toxicariis e Mundo Novo Tropicale Commentationes III. Phytochemical examination of Spruce's original collection of *Banisteriopsis caapi*." *Botanical Museum Leaflets Harvard University* 22:139-147.
- Schultes, R.E. , and R.F. Raffauf. 1960. "Prestonia: An Amazon narcotic or not? ." *Bot. Mus. Leaflet. Harvard Univ.* 16:109-124.
- Spruce, R. 1873. "On Some Remarkable Narcotics of the Amazon Valley and Orinoco." *The Geographical Review* (August):184-193.

- Spruce, Richard, and Alfred Russel Wallace. 1908. Notes of a Botanist on the Amazon & Andes: being records of travel on the Amazon and its tributaries ... as also to the cataracts of the Orinoco, along the eastern side of the Andes ... and the shores of the Pacific ... during the years 1849-1864 ... Edited and condensed by Alfred Russel Wallace ... With a biographical introduction, portrait, seventy-one illustrations, and seven maps. London: Macmillan & Co.
- Stibe, C., A. Lees, and G. Stern. 1987. "Subcutaneous infusion of apomorphine and lisuride in the treatment of parkinsonian on-off fluctuations." *Lancet* 1 (8537):871. doi: S0140-6736(87)91660-6 [pii].
- Udenfriend, S., Witkop, B., Redfield, B.C., Weissbach H. . 1958. "Studies with reversible inhibitors of monoamine oxidase: harmaline and related compounds." *Biochem Pharmacol.* 1:160-165.