

(TRANSLATION)

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*Received on 28 April 2000*

Pro Justitia

Expert's Report commissioned by the Examining Judge [*Rechter-Commissaris  
in Strafzaken*] of the Amsterdam District Court  
in the case of  
*the PUBLIC PROSECUTION SERVICE v. FIJNEMAN and  
the PUBLIC PROSECUTION SERVICE v. BOGERS,*  
*r. c. numbers 99/4416 and 00/4418,*  
public prosecutors' office numbers 13 / 067455-99 and 13 / 067456-99

Amsterdam, 24 April 2000

Professor F.A. de Wolff

## Introduction

This Expert's Report has been drawn up by Professor F.A. de Wolff, a clinical chemist and toxicologist practicing in Amsterdam, and attached to the Leiden University Medical Centre [*Leids Universitair Medisch Centrum*] as Professor of Clinical and Forensic Toxicology and to the Academic Medical Centre [*Academisch Medisch Centrum*] of the University of Amsterdam [*Universiteit van Amsterdam*] as Professor of Human Toxicology, and also practising as a consultant in the field of toxicology.

The analysis for the purpose of this Report was carried out after I had been sworn in and appointed as expert on 14 January 2000 by Mr M.C.P. de Ridder, Examining Judge [*Rechter-Commissaris*] in charge of criminal proceedings at the Amsterdam District Court. In view of the documents in the proceedings against Ms G.J.C. Fijneman (*r.c.* number 99/4416, public prosecutors' office number 13/067455-99) and against Mr J.C. Bogers (*r. c.* number 99/4418, public prosecutors' office number 13/0674561-99), the Terms of Reference for the Expert's Report were defined in the following terms:

*'(...) to analyse the health effects, including addiction and dependence, relating to the use of DMT, possibly in combination with other substances;*

*which analysis should also pay attention to the contents and manner of the information supply, if any, regarding the use and effect of the substance, and the 'religious setting' in which the consumption of the substance takes place (...)'.* In drawing up this Report, the following sources have been used: 1. a fax message by the Examining Judge, dated 14 December 1999, with the analysis **report 1831N99**,

dated 15 October 1999, drawn up by Mr R. Jellema, the expert of the Amsterdam-Amstelland Police Force; 2. a dossier sent by the Examining Judge on 4 February 2000; 3. a dossier sent by Counsel for the Defence via the office of the Examining Judge; 4. publications concerning the relevant substances derived from publicly available scientific

literature, as well as a report entitled *Smart shops: a survey of products, their supposed effects and medical-toxicological relevance* (report no. 348802 017, March 1999, published by The National Institute of Public Health and Environmental Hygiene [*Rijks-instituut voor Volksgezondheid en Milieuhygiëne* or *RIVM*]).

For the sake of readability, references are not included in the text; on request, a survey of the sources referred to can be provided.

## Definitions and explanations of some terms used in this Report

A *dose* is a quantity of a substance (generally expressed in milligrams - mg) ingested or taken otherwise to achieve a specific effect; *concentration* denotes a quantity of a substance per unit of volume or weight (for example, in milligrams per liter - mg/L - or milligrams per kilogram -mg/kg).

Toxicity denotes the property of a substance to produce a harmful effect on the user. Toxicity depends not only on the *nature* of the substance but also on the *dose*: for each substance - no matter how safe it may be - there is a dose beyond which toxicity may occur.

A *neurotransmitter* is a naturally occurring chemical agent responsible for the chemical passing of impulses from one nerve cell to the next.

*Tolerance* or *habituation* denotes the phenomenon that the body needs more and more of a specific substance to produce an effect similar to the one produced before with a lower dose.

*Dependence* on a substance denotes the phenomenon that the *body* is no longer able to function optimally without taking the relevant antigen.

*Addiction* is defined as *psychological dependence*, in this case on a chemical.

*Health effect* means the effect on the health of one person or of a limited group of persons; *public health effect* means that exposure to an external factor (in this case an antigen) constitutes a risk for a significant part of the population; the difference in size between the two groups is quite arbitrary.

N.B.: The aforementioned terms have been defined for the purposes of this Opinion; the definitions may deviate slightly from definitions used in other sources.

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## DMT and Ayahuasca

DMT is an abbreviation of N,N'-dimethyltryptamine (a hallucinogenic drug), which is the most important representative of a group of compounds that in view of their pharmaceutical time course are classified as 'tryptamines having a short-lasting effect'. These compounds occur naturally in a considerable number of mostly South-American species of plants. The chemical structure of DMT is akin to that of the neurotransmitter 5-hydroxytryptamine or *serotonin*: the effect of DMT on the central nervous system (in particular, the hallucinogenic effect) can be attributed to this kinship. Neurones (nerve cells) that use serotonin as a neurotransmitter are associated with a number of vital functions, such as sleeping, thermo-regulation, appetite, memory and mood. Accordingly, the effect of many mood-affecting drugs, such as antidepressants, is based on an interference in specific functions of serotonin. Soon after being administered orally, DMT is degraded by the enzyme monoamine oxidase (MAO), for which reason DMT as such does not reach the central nervous system. A dose of DMT administered by mouth is not active per se. Viewed from this perspective, it is not entirely clear why DMT has since the 1970s been included as such on List I under C of the Opium Act [a Dutch Act dealing with narcotics]. Some ethnopharmacological sources indicate that substances resembling DMT are sometimes smoked or sniffed to avoid degradation by MAO; since DMT was not administered in this way in the cases under review, this Report will not dwell on this point any further.

In order to make the oral administration of DMT effective, the hallucinogenic compound is sometimes combined with another substance, which blocks the action of MAO, thus enabling DMT to reach the central nervous system. In regular medicine, MAO inactivation by so-called MAO inhibitors has been applied for the treatment of depressions for years now.

For the purposes of the rituals of the Santa Daime Church, a vegetable extract is used, prepared according to a strictly regulated procedure (*feitio*) based on a Shamanic tradition in Peru and Brazil. The principal active substances are hallucinogenic DMT and the MAO inhibiting harmaline alkaloids (which may be psychoactive even in the absence of DMT). Leaves of the Rainha plant (*Psychotria viridis*), symbolizing womankind and the moon, are used as a source for DMT; while the liana jagube (*Banisteriopsis caapi*), symbolising manhood and the sun, is used as a source for harmaline alkaloids. The product of this preparation, a tea, is called *ayahuasca*, which is reported to mean 'vine of the dead & souls' in Quechua. Lay physicians practising in the virgin forests of Peru, Colombia and Brazil are also referred to as *Ayahuasqueros*.

As the present case involves the consumption of ayahuasca rather than DMT alone, this report will use the term 'ayahuasca' instead of 'DMT', as in the Terms of Reference.

## Effects of ayahuasca

### *Desired effects*

People who take ayahuasca seek to attain a frame of mind in which they become more receptive to mystical religious feelings; deepening insight and supposed contacts with extraterrestrial beings are among the effects reported. Visual hallucinations (perceptions of vivid, moving images) are reported, too. The international psychiatric literature makes mention of 'healing sessions' being held by the *Ayahuasqueros*. During these late-night sessions, the patient is administered a quantity of ayahuasca tailored to his personal needs under controlled circumstances. After 20 minutes the effects begin to occur: changes in visual perception, sensitivity to sounds, feelings of depersonalisation, out-of-the-body experiences. During a session lasting about 4 hours, the *Ayahuasqueros* render personal advice to the patients and treat the painful parts of their bodies. A 1996 publication describes a study into the psychological effects of ayahuasca on members of the religious community of União do Vegetal in the Brazilian city of Manaus, which - like the Santo Daime Church - administers tea as a sacrament. A psychopathological remission was found without any deterioration of personality and cognitive functions.

The descriptions of a *hinario*, an ayahuasca session, are quite reminiscent of the *velada*, the night-time healing session of the *curanderas* of the Mexican Mazatecs, during which mushrooms containing psilocybin are used. This supports the view that the administration of psychedelic drugs for therapeutic purposes has been widespread in Central and South America for many centuries. In view of the religious context and the description that users experience deep religious sensations after taking these drugs, these substances are also called 'entheogens' ['entheogen' meaning 'God within us'].

### *Undesired effects*

It is reported that gastrointestinal reactions, such as nausea and vomiting, may develop after the ingestion of ayahuasca. However, those taking the drug do not have only negative experiences, for the reactions are seen as part of a process of purification. Besides being pleasant, the hallucinations or visions can also be frightening; for example, it is reported that some users under the influence of the drug have visions of big snakes or carnivores. Usually, the visions can be 'talked down', which means that they disappear or become less frightening because the user concerned is 'talked out of them' by another person. According to descriptions of users, ayahuasca consumption does not appear to have hangover or any other late adverse effects: it is reported that after a night-time session, users just resume their work the next day.

In addition to these quite mild undesired effects, there is a possibility of more serious symptoms of acute toxicity: hypertension and a higher body temperature, tachycardia (rapid pulse rate) and hyperventilation, sensory impairment in the limbs and difficulty in walking. A person's behaviour under the influence of a hallucinogen could be unpredictable.

Another risk involves the interaction between substances present in ayahuasca and foods and medicines. For many years now, it has been known that anti-depressants based on the inhibiting effect on the enzyme monoamine oxidase, the so called MAO inhibitors, should not be used in combination with other medicines affecting the serotonin system and certain foods. The latter category includes red wine, specific types of cheese, sour dairy products and overripe bananas and avocados. They contain the chemical tyramine, which in the presence of a MAO inhibitor, may induce a substantial increase in blood pressure with all the risks involved.

### *Dose in relation to effects*

Just like the desired effects of ayahuasca, the toxic effects depend on the dose used. In preparations of a natural origin - such as ayahuasca - the dose is always hard to define. The concentration of agents may vary as a result of, *inter alia*, the composition of the soil, seasons, and the method of preparation. Without a chemical analysis, it is impossible to give a decisive answer as to the nature and quantity of agents in a preparation. However, with the aid of the few data the literature has to offer, and the analysis report provided by the laboratory of the Amsterdam-Amstelland Police Force, a reasonably reliable estimate of the doses of DMT used in the case under review can be made.

A publication on a research project involving volunteers who had DMT injected directly into the bloodstream indicates that doses exceeding 0.2 mg per kg of body weight (which is 14 mg per person weighing 70 kg) may be hallucinogenic and may increase the blood pressure, the body temperature, and the pulse rate. The highest dose used in the experiment was 0.4 mg/kg. After 30 minutes' time, there was no longer any considerable quantity of DMT in the bloodstream. A semi-quantitative analysis of the ayahuasca seized on 6 October 1999 revealed a concentration of 3 - 4 g of DMT in the total liquid volume of 17.5 liters, which is 200 mg/L. If we assume that approximately 200 ml of ayahuasca tea can be consumed at once, this equals a dose of 40 mg of DMT per person. At first, this seems three times as much as the aforementioned 14 mg of DMT per person as the lowest effective dose. However, in the research project carried out with volunteers, DMT was injected directly into the bloodstream, whereas during the Santo Daime services, tea containing DMT is drunk. The biological availability, which denotes the percentage of the ingested substance taken in by the intestine and appearing in the bloodstream, will be well below 100% as a result of insufficient reception and degradation of DMT during the process of reception. Besides, in the event of an injection, the peak concentration will occur soon afterwards, but after ingestion, it will occur only after about 20 minutes. Following the administration of an equivalent dose, the peak concentration will therefore be considerably lower after ingestion than after injection.

For the foregoing reasons, the conclusion can be drawn that the DMT doses the participants in the Santo Daime services administered to themselves had but a small effect compared to the findings of the aforesaid research project carried out with volunteers. Apart from that, these considerations do not take into account that ayahuasca contains other psychoactive substances, including the MAO-inhibiting harmaline alkaloids. These will undoubtedly result in DMT remaining effective for a longer period than the few dozens of minutes following the injection of DMT only. In view of the limited availability of data, it is not possible to make a clearer statement in this respect.

Incidentally, it should be noted that the text of the official reports dated 6 October 1999 creates some confusion regarding the quantities seized. Mention is made of 'approximately 15 litres of DMT'; it is suggested that DMT is a liquid and that a volume of 15 litres was seized. As stated in Mr Jellema's analysis report dated 15 October, a total volume of 17.5 litres of liquid was seized, in which a total amount of 3 - 4 g of DMT was found.

#### *Dependence and addiction*

The literature is silent on the potency of ayahuasca in respect of tolerance, dependence and addiction. Any considerations in this respect should therefore be based on a comparison with other hallucinogens. To date, no evidence has ever surfaced that suggests that the recreational consumption of hallucinogenic products could result in physical dependence and psychological addiction. This applies even to the synthetic hallucinogen LCD. Perhaps, it is best to draw a parallel between LSD and the mushrooms containing psilocybin-/psilocin,

which are known to create tolerance within a short space of time: if a few days after mushroom intoxication, a dose is administered in order to create a similar pleasant experience, this latter one turns

out to be ineffective or hardly effective. Perhaps this property in itself provides some protection against addiction. In view of the limited consumption frequency in the context of the Santo Daime services (about twice a month), it is possible to draw the conclusion that congregants do not develop any tolerance of nor a dependence on or addiction to ayahuasca. It cannot be entirely ruled out that experienced users sometimes have a yearning for an ayahuasca experience. In essence, such a yearning will not differ from the yearning some people have for chocolate or green herring. By way of comparison, a yearning for coffee has a different basis: there is indeed such a thing as a dependence on caffeine. Many coffee drinkers develop a headache when they postpone drinking their morning coffee: the well-known 'weekend headache'. Coffee as a drink also has an addictive potency; besides caffeine, taste and smell play a role in this. Incidentally, the psychoactive effect of vegetable based products - including the stimulating effect of coffee - is widespread. Lesser known examples of it are the generally and freely available hallucinogenic spices: nutmeg and mace. The former is the ground nut of the nutmeg tree *Myristica fragrans*; the latter is the dried aril of the same tree. One of the agents in these products is myristicin, which has a similar effect as DMT and harmaline alkaloids. It has, *inter alia*, a MAO-inhibiting effect: a matchbox filled with nutmeg powder would be sufficient to induce hallucinations.

In this context, reference can also be made to *Catia edulis*, a plant whose parts are chewed in countries such as Yemen and Somalia, as well as in the Netherlands by persons originating from these countries, as psychoactive stimulants. The agents in this plant, generally referred to as Qat or Miraa, are *cathinon* and *cathine*, which are included in list I and II, respectively, of the Dutch Opium Act. Nevertheless, the Supreme Court of the Netherlands took the following view: 'The prohibitions contained in Sections 2 and 3 of the Opium Act do not relate to plants and parts of plants, in the present case Qat, that are not on List I or List II (Judgment no. 3235 dated 29 November 1994). A discussion of the Supreme Court's considerations, also in relation to the problems surrounding mushrooms containing psilocybin and psilocin, falls outside the scope of this Report.

### Use of and information about ayahuasca in a religious context

**The Terms** of Reference explicitly stated that attention ought to be paid to the religious setting in which the consumption of ayahuasca takes place, the information provided in this context, and the potential health effects.

#### *Information*

With respect to the *information*, reference is made to Exhibits 2 and 4 attached to the letter dated 14 February 2000 written by the lawyer Ms A.G. van der Plas. Exhibit 2 contains concise information about the consumption of ayahuasca and cannabis as well as a few questions about the physical and mental health condition of those interested in an introductory meeting. (Incidentally, it should be noted that Exhibit 2 is not complete; the backsides of the articles have not been copied. Nevertheless, it is possible to gain a clear picture of this material.) The information is concise; in particular, questions can be raised about the effects of the combination ayahuasca-cannabis, which might be different than the sum of the separate effects. However, the questions about the health condition of the interested parties indicate to a sufficient extent that the consumption of these substances involves individual risks. Exhibit 4 provides much more detailed information; as is evident from Ms van der Plas's letter dated

14 February 2000, this information is made available in advance to the newcomers who have shown an interest. In general, the information concerned is correct and up-to-date; sufficient attention is paid to the potential health effects of ayahuasca in relation to medication, food and diseases. At the most, it is possible to criticise some points of minor importance: on page 2, 4th paragraph, it is stated that L-Dopa and Tegretol are

administered in the event of mental disorders; however, they are administered in the event of neurological diseases [Parkinson's disease, epilepsy and trigeminal neuralgia (facial neuralgia)]. Tegretol is mentioned in paragraph 8 again, but then under its generic name 'Carbamazepine'. Despite these and a few other minor defects, the information provided is to the point and gives a reliable picture of the potential risks of ayahuasca consumption.

### *Religious Setting*

~~The production of ayahuasca tea as well as its consumption during religious meetings is subject to strict regulations. A priori, it appears impossible that the vegetable extract could be 'spiked' (enriched) with synthetic or purified DMT or harmaline alkaloids. (Incidentally, it is unknown whether DMT has ever been marketed as a synthetic drug.)~~

According to the information available, ayahuasca is used exclusively in the context of worship. The dossier is not explicit about the frequency; Exhibit 3 is not quite clear about this point. Concentration sessions (page 20 *et seq.*) are held on each 15th and 30th day of the month; presumably, the tea is consumed on those occasions. On the first Monday of each month the deceased are remembered and the tea is drunk on that occasion, too. Whether the tea is also consumed during other meetings cannot be inferred from the information available. It is clear, however, that consumption is linked to rituals and that it always takes place in the presence of others who are familiar with the effects. During night-time meetings, the ayahuasca tea is drunk several times, with intervals of about two hours, which could indicate on the one hand that it has short-term effects, and on the other hand, that its capacity to induce tolerance is only slight. Several times, the dossier mentions the fact that the participants feel well after the meeting is over and can even resume their working lives immediately afterwards. Even though it is risky to draw conclusions on the basis of subjective statements, the foregoing appears to point to the absence of withdrawal symptoms or feelings associated with a 'hangover'. In any case, no evidence has emerged that suggests the presence of permanently harmful effects of ayahuasca consumption in this religious context.

In general, it is possible to conclude that the strictly regulated consumption of ayahuasca in a religious 'setting' protects the users of psychoactive products, such as ayahuasca, against abuse.

### **Conclusions**

For all the foregoing reasons, the following conclusions can be drawn:

1. Ayahuasca consumption may involve health risks in individual cases.
2. Generally, the information about these risks provided by the Santo Daime Church to the participants in their meetings is correct and adequate.
3. The limited availability of ayahuasca and the strictly regulated conditions surrounding the consumption thereof provides protection against abuse on the part of the congregants;

4. In view of points 1-3, as well as the limited scale of the Santo Daime Church, it is not plausible, according current scientific thinking, that ayahuasca consumption constitutes a health hazard.

Made and subscribed under a solemn affirmation, dated 24 April 2000

[signature]  
Professor F.A. de Wolff  
Clinical Chemist and Toxicologist

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