

## Short Communication

# Daime — a ritual herbal potion

G.E. Liwzyc<sup>a</sup>, E. Vuori<sup>b</sup>, I. Rasanen<sup>b</sup>, J. Issakainen<sup>c</sup>

<sup>a</sup>Department of Pathology, <sup>b</sup>Department of Forensic Science, <sup>c</sup>Mycology Division, Botanical Museum, University of Helsinki, Haartmaninkatu 3, SF-00290 Helsinki (Finland)

(Received September 17, 1991; accepted October 31, 1991)

### Introduction

Many Indian tribes of the Amazon basin use a herbal potion for religious and medicinal purposes. It has different names according to the region (Ayahuasca, Caapi, lagé, Daime) but, basically, it is a decoction of two plants growing in the jungle, *Banisteriopsis caapi* and *Psychotria viridis*.

In this region, the mixing of Indian, European and black races, although basically Catholic, has produced a mixed belief in God, jungle Gods and spirits. This cult is expanding rapidly, beyond its original boundaries, and is now practiced in the big cities of the area (Time Magazine, 1989; Jornal do Brasil, 1989), as well as in nearby South American countries whose native population never used the potion.

Although many papers have been published about the chemical extracts from the plants used to prepare Daime, only a few chemical analysis have been carried out on the beverage as it is consumed (River and Lindgren, 1972).

### Material and Methods

We received a sample of Daime (50 cm<sup>3</sup>) used in a religious ceremony in South America. Cultures were carried out on Sabouraud agar streptomycin penicillin (SSP) and on brain heart infusion blood agar (BHIB) at room temperature (approx. 25°C) as well as in an incubator at 37°C.

A capillary gas chromatographic-mass-spectrometric study was carried out in a Hewlett Packard 5890 chromatograph equipped with a HP 5970

series mass selective detector and a 12 m HP-1 column.

All other reagents were of the highest commercially available purity.

### Results

The liquid was macroscopically brown, resembling home brewed ale. Native microscopy showed profuse, large yeast cells with a minor population of smaller yeast cells, fragments of mycelial mass, non-living granules and oil-like droplets. On SSP at 37°C *Zygosaccharomyces bailii* grew profusely as a pure culture (strain deposited in CBS N° 7.555). On BHIB, at 25°C there was a moderate growth of a *Penicillium* species (resembling *P. thomii*) as a pure culture. Corresponding amounts of both fungi grew mixed on SSP at 25°C. On BHIB at 37°C an apparently monospecific bacterial growth (small rods or cocci) was observed. The strain was unfortunately lost during a study interval and could not be recovered from the potion stored at +4°C.

A capillary gas chromatographic-mass-spectrometric study carried out from basic dichlorinethane-isopropanol (95:5, pH 11) extract of the sample, revealed the presence of three main alkaloids: dimethyltryptamine (DMT) 530 mg/l; harmine 1490 mg/l; and tetrahydroharmine 1390 mg/ml. Additional traces of harmaline were detected.

### Discussion and Conclusions

It has been shown that harmine and harmaline

inhibit tryptophane hydroxylase and MAO (in vitro) (Hashimoto et al. 1970). This may be the reason in part of the hallucinogenic effect of this potion since this enzyme metabolizes amines and its inhibition increases epinephrine and norepinephrine concentrations in the organism (Sano et al. 1959; Hoffer et al. 1967; Pletscher et al. 1959). It has been claimed that DMT is inactive when ingested per os, however this may not be true when combined with MAO inhibitors (harmine compounds), which would potentiate the DMT effect.

The effect of Daime varies according to the preparation technique (Bongiorno de Pfirter, 1984) doses and type of mixture, and possibly also the circumstances during which it is consumed (prayers, singing and dancing). The leaves of the plants are macerated, boiled and bottled.

Previously it has been estimated that a 200 ml portion of Daime contains 30 mg of harmine, 10 mg of tetrahydroharmine and 25 mg of DMT (Bongiorno de Pfirter et al. 1984). In our sample of an equal amount we found considerably more active substances: 298 mg of harmine; 106 mg of DMT; and 278 mg of tetrahydroharmine.

The old Amazon Indian herbal potion which is served by the expanding religious cult contains pharmacologically active hallucinogenic principles.

## Acknowledgements

The CBS laboratories (Central Bureau voor Schimmelcultures) in Delft and Baarn (Holland) and the staff of the Department of Bacteriology and Immunology, University of Helsinki, are acknowledged.

## References

- Anon. (1989) *Jornal do Brasil* March 29th.  
 Anon. (1989) *Time Magazine*, Scene, New York, October 9th, p. 9.  
 Bongiorno de Pfirter, G. and Mandrile, E. (1984) Active natural principles with hallucinogenic activity: harmaline and harmine. Its presence in the *Banisteriopsis* (Malpighiaceae) species. *Acta Farm. Bonaerense* 3, 161–8.  
 Hashimoto, Y., Kawanishi, K., Hayaishi, O. and Ichiyama, A. (1970) Hallucinogenic compounds of the Amazon, and serotonin degradation. *An Acad. Bras. Cien.*, suppl 42, 377–390.  
 Hoffer, A. and Osmond, H. (1967) *The Hallucinogens*, Academic Press, New York, p. 472, p. 80.  
 Pletscher, A., Bernsdorf, H., Bachtold, H. and Gay, K. (1959) *Helv. Physiol. Pharmacol. Acta* 17, 202.  
 Rivier, L. and Lindgren, J.E. (1972) Ayahuasca, the South American hallucinogenic drink: an ethnobotanical and chemical investigation. *Econ. Bot.* 26, 101–129.  
 Sano, Isamu and Ayumi, I. (1959) *Progress of Medicine, Tokyo* 30, 232, 306, 438, 498.