

## Introduction

Bromobenzodifuranyllisopropylamine (Figure 1) also known as Bromo dragonfly (DOB-Dragonfly, ABDF, BrDF) is a synthetic psychedelic compound belonging to the phenethylamine family. It was synthesised in 1998 and began to emerge as a "street drug" in Sweden, Denmark, Germany, Australia and the USA by 2005. The R(-) stereoisomer is more active. Its psychedelic effects are due to agonistic action on serotonin receptors, in particular the 5-HT<sub>2</sub> sub-family.<sup>[1]</sup> The list of effects associated with its use includes: hallucinations, muscle tension, memory loss, confusion, panic, anxiety. Potency and long duration of action are effects of chemical configuration; the phenyl ring of the molecule is situated between two dihydrofuran rings.<sup>[2]</sup> Duration of action may vary from 12 up to 72 hours, effects are delayed and may not occur for up to 6 hours.<sup>[3]</sup> It has been sold as a liquid and powder, it also appears as a blotter and therefore can be mistaken for lysergic acid (LSD).

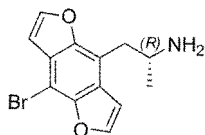


Figure 1. The chemical structure of Bromo dragonfly

## Case study

An 18 year old male presented to an Emergency Department (ED) following the consumption of two powders: unknown white powder and Bromo dragonfly. All the symptoms: severe agitation, tonic-clonic seizures and hallucinations developed 8 hours after ingestion. His Glasgow Coma Score was 3/15 and blood pressure 182/94. His pupils were dilated and he was apyrexial. Serum, urine and a paper wrap (Figure 2) were sent to the Forensic Toxicology Service, St George's, University of London for analysis.



Figure 2. Paper wrap submitted with other samples

Routine screening of serum and urine samples detected cannabinoids, ketamine and its metabolites. Lidocaine, lorazepam and midazolam were present as a result of treatment given in ED. Analysis of serum, urine and powder from the paper wrap using liquid chromatography with tandem mass spectrometry (LC/MS/MS) identified Bromo dragonfly. Presence of the compound in the powder was also confirmed by gas chromatography mass spectrometry (GC/MS) (Figure 3), ultraviolet visible spectrophotometry (UV/VIS) (Figure 4) and thin layer chromatography (TLC).

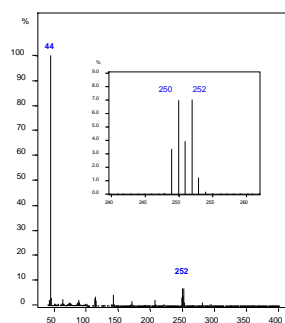


Figure 3. Bromo dragonfly GC/MS mass spectrum

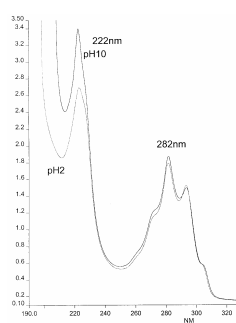


Figure 4. Bromo dragonfly UV spectrum

## Extraction

100µL of calibrator/sample, 25µL of 0.1mg/L IS, 100µL of 1M sodium hydroxide and 1mL of MTBE were added to 2mL polypropylene tubes and mixed for 15 minutes. Following centrifugation the organic phase was transferred to 4.5mL polypropylene tubes containing 1% formic acid. The samples were then mixed for 10 minutes and centrifuged. The organic layer was removed and 25µL of the formic acid layer was injected onto the LC/MS/MS system.

## Method

The LC system consisted of a Perkin Elmer PE200 Series autosampler, pump and column oven. Chromatography was achieved using a Alltech Alltima C18 (150 x 2.1mm, 5µm) column maintained at 50°C. The mobile phase consisting of methanol/de-ionised water/5M ammonium formate (80/20/0.1, v/v/v), was pumped at 250µL/min. Bromo dragonfly and the IS eluted after 2.31 and 2.24 minutes respectively (Figure 5).

Detection was by tandem MS/MS (Sciex API2000) equipped with a turbo-ion spray interface held at 300°C, in positive ionisation mode.

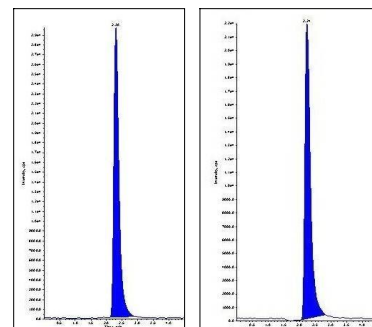


Figure 5. Chromatograms of Bromo dragonfly (Left) and Bromoperidol (right)

The multiple reaction monitoring transitions for Bromo dragonfly were  $m/z$ : 293.9/197.7 and  $m/z$ : 295.9/197.9 for the 79Br and 81Br isotopes respectively (Figure 6), and  $m/z$ : 420.1/165.1 for bromoperidol.

Bromo dragonfly was detected in the powder, urine and at a concentration of less than 5ng/mL in serum.

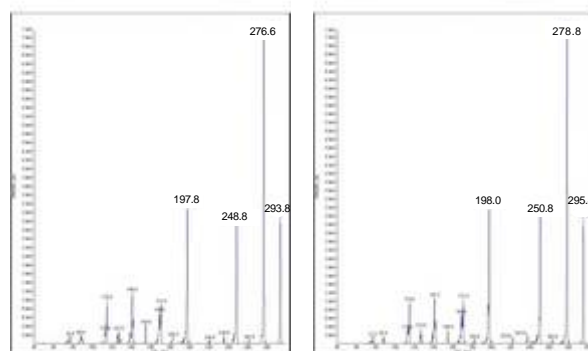


Figure 6. Initial product ion spectra for 79 and 81 Br

## Conclusion

The presented case is an example of recreational poly drug use. All described symptoms and delayed onset are likely to be associated with Bromo dragonfly ingestion. The serum concentration of ketamine (200ng/mL) was subtherapeutic. Bromo dragonfly is a research compound with limited data, currently controlled only in Denmark and Sweden, which entered the recreational drug market. The submission of solid dose material along with biological specimens facilitates the monitoring of new abused compounds. More comprehensive toxicological ED screening would allow the extent of novel designer drug use to be fully determined.

## Chemicals and Reagents

Bromo dragonfly (purity 95%) was obtained as a research chemical from China. Bromoperidol, obtained from Janssen Pharmaceutica (Beerse, Belgium), was used as an internal standard (IS). Sodium hydroxide (40% solution) and ammonium formate were purchased from BDH (Poole, Dorset, England). De-ionised water was prepared on site (ELGA Limited). HPLC grade methanol and methyl-tert-butyl-ether (MTBE) were purchased from Rathburn Chemicals Limited (Walkerburn, Scotland).

## References

- [1] M Parker et al. A novel (benzodifuranyl)aminoalkane with extremely potent activity at the 5-HT<sub>2</sub> receptor. *J Med Chem.* 1998;41:5148-5149
- [2] A Shulgin and A. Shulgin, 1998, PIHKAL: a Chemical love story
- [3] [www.drugs-forum.co.uk](http://www.drugs-forum.co.uk)