2C-B: A New Psychoactive Phenylethylamine Recently Discovered in Ecstasy Tablets Sold on the Swiss Black Market

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Abstract

This study sought to identify, by means of several analytical methods (GC–MS, HPLC–DAD, CE–DAD, FTIR, and NMR), 4-bromo-2,5-dimethoxyphenethylamine (2C-B), which was found in two sets of tablets obtained from the Swiss black market. Unequivocal identification of 2C-B was only achieved by a combination of mass spectrometric and NMR analysis. Quantitation of 2C-B was performed by HPLC–DAD and CE–DAD. The amounts of 2C-B found in the tablets (3–8 mg) were in the range of the minimum quantity required to induce the effects characteristic of this drug.

Introduction

4-Bromo-2,5-dimethoxyphenylethylamine (2C-B, Figure 1) is a psychoactive drug related to mescaline (3,4,5-trimethoxyphenylethylamine) and other structurally similar drugs such as 4-methyl-2,5-dimethoxyamphetamine and 4-bromo-2,5-dimethoxyamphetamine. All of these drugs possess significant abuse potential (1).

2C-B, also known under a variety of street names such as "Venus", "Bromo", "Erox", and "Nexus", should be considered as an illegal substance with regard to the Swiss law on narcotic substances. Only scarce data exist about its pharmacological properties, metabolism, and toxicity (1–4). Because of its very low cross-reactivity, 2C-B is hardly detectable in urine with commercially available immunoassays (5,6), and nothing is known about its use and involvement in morbidity, mortality, and car accidents. Moreover, very little data exist about the composition of 2C-B tablets.

In humans, 2C-B is active at doses between 4 and 30 mg. Within this range, the ingestion of 2C-B induces considerable euphoria with an increased receptiveness of the visual, auditory, olfactory, and tactile sensations. These effects are very likely mediated because of the affinity of central serotonin receptors (1). Higher doses may cause frightening hallucinations and unexpected heavy trips, and it is impossible for the consumer to know the exact content of a "street" tablet. The duration of action is between 4 and 8 h (7,8).

2C-B is frequently combined with Ecstasy and other related compounds or taken together with ketamine. It is difficult to determine if 2C-B and ketamine are taken simultaneously or separately during the same psychedelic trip, and the formal identification of 2C-B is difficult because many related compounds and isomers can be found on the black market (7,9). For instance, all possible isomeric dimethoxybenzaldehydes (2,3-, 2,4-, 2,5-, 2,6-, 3,4-, and 3,5-) are commercially available (e.g., from Fluka and Aldrich) and can be used as precursors for the synthesis of 2C-B and of its positional isomers. DeRuiter et al. (10) showed that the mass spectra of some of the isomeric bromo-dimethoxyphenylethylamines differ only in the relative abundance of some high mass fragment clusters. Therefore, mass spectrometry alone does not allow full identification of the substitution pattern (11).

Here, we report on the composition of two kinds of street tablets sold in the French part of Switzerland as Ecstasy in which 2C-B was detected as one of the main psychoactive compounds. 2C-B was unequivocally identified by means of several analytical tools such as infrared (IR) and ultraviolet (UV) spectroscopy, mass spectrometry (MS), and nuclear magnetic resonance (NMR) spectroscopy.

Material and Methods

Case history

Case 1 (sample A). The 2C-B tablets were seized by the police together with other pills containing amphetamine or methylenedioxymethamphetamine and/or various Ecstasy analogues, methylenedioxyamphetamine, *N*-methyl-1-(3,4-methylenedioxyphenyl)-2-butanamine (MBDB), and methylenedioxyethylamphetamine (MDEA). The tablets were round, 1-cm wide and 3-mm thick, white, with a dollar logo on one side and a small step scored on the reverse side, and weighed about 320 mg each (Figure 2).

Case 2 (sample B). The 2C-B tablets were very likely seized before the dealer could sell them on the street. They were purchased abroad along with several "smart drugs". The pills were round, 0.5-cm wide and 2-mm thick, white, stepped on both sides, not scored, and weighed about 50 mg each (Figure 2).

Chemicals and standards

2C-B and MBDB standards were obtained as hydrochlorides through Research Biochemicals International (RBI®, Natick, MA). The internal standard (2-phenylethylamine) used for the capillary electrophoresis (CE) quantitation was purchased from Fluka (Buchs, Switzerland). The seized tablets were collected by the Institute of Legal Medicine of the University of Lausanne. Ultrapure water was provided by a Milli-Q RG unit from Millipore (Bedford, MA). Deuterated water (D_2O: 99.95 atom%D) used as solvent for NMR experiments was provided by Aldrich (Buchs, Switzerland). All other reagents, solvents, and substances were analytical-grade reagents from Fluka.

Sample preparation

Gas chromatography–mass spectrometry (GC–MS) and high-performance liquid chromatography–diode-array detection (HPLC–DAD). The tablets were crushed with a mortar and pestle before preparing a methanolic stock solution (10 mL) at 1 mg powder/mL. For GC–MS, samples were analyzed either underivatized or after acetylation or methylation. The acetylation process was performed as follows: one drop of an ethanolic solution of 1% HCl was added to 100 µL of the methanolic stock solution of the exhibit. After this, the sample was taken to dryness under a stream of nitrogen and acetylated at 60°C during 30 min with 100 µL of a mixture of acetic anhydride and pyridine (3:2, v/v). After evaporation of the reagent and addition of 100 µL of ethyl acetate to the residue, 1 µL was injected into the GC–MS. Methylation was performed as follows: 50 mg anhydrous potassium carbonate, 180 µL acetonitrile, and 20 µL iodomethane were added to the dry residue; after methylation

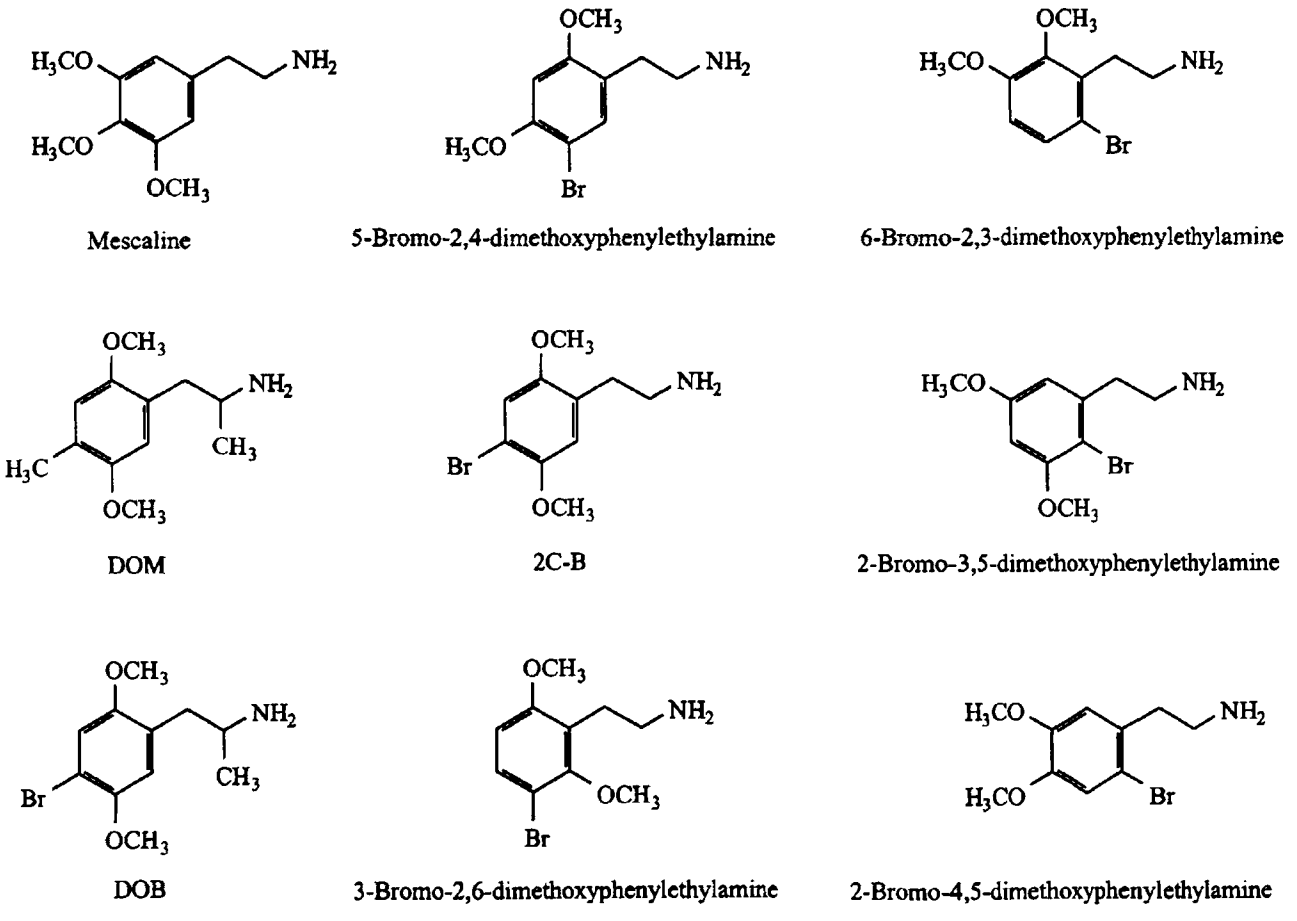

Figure 1. Chemical structures of 2C-B and related compounds. Abbreviations: 2C-B, 4-bromo-2,5-dimethoxyphenylethylamine; mescaline, 3,4,5-trimethoxyphenylethylamine; DOM, 4-methyl-2,5-dimethoxyamphetamine; and DOB, 4-bromo-2,5-dimethoxyamphetamine.

Figure 2. Photographs of the two sets of seized tablets (sample A with $ imprint). Dimensions are in millimeters.

over 3 h at 60°C, 1 µL was injected into the GC–MS.

CE. Before analysis, each tablet was weighed and pulverized into a fine and homogeneous powder. We prepared two stock solutions by dissolving approximately 10 mg of each tablet in 10 mL of 0.1M HCl (sample A). For sample B, only one stock solution was prepared by dissolving approximately 3 mg of each tablet in 10 mL of 0.1M HCl, in order to keep sufficient material for further NMR studies. The solutions were sonicated for 30 min to facilitate the solubilization, then vortex mixed and filtered through 0.45-µm nylon Titan syringe filters (Scientific Resources Inc., Eatontown, NJ). The internal standard was added during the final dilution step of the previously mentioned filtered solutions in order to reach a concentration of 10 mg/mL.

Liquid–liquid extraction. Before the investigation by NMR and IR, the tablets containing only 2C-B (sample B) were individually ground with a mortar and pestle to a fine and homogeneous powder. Aliquots were withdrawn for quantitation. The remaining crushed tablets were gathered, and the whole lot was dissolved in 3 mL of 0.1M HCl. The solution was sonicated for 30 min. Two-hundred microliters of NH_4OH (25%) and 6 mL of methylene chloride (HPLC grade) were added.

The solution was mixed for 1 min in a vortex mixer and 20 min in a rotative mixer. After centrifugation for 6 min at 4000 rpm (approximately 1750 × *g*) and after freezing the aqueous phase at –20°C, the organic phase was collected. For acidification, 200 µL of a solution of HCl/isopropanol (1:4, v/v) were added. The organic solvent was evaporated to dryness under nitrogen, and the residue was used for IR and NMR investigations.

Equipment

GC–MS. The samples were analyzed with a Hewlett-Packard (HP) 5890 GC fitted with an HP 7673A automatic liquid sampler and equipped with a quadrupole HP 5971 mass selective detector. Electron-impact full mass spectra were obtained at an ionization voltage of 70 eV. The analytes were separated with a HP Ultra-2 capillary column (fused silica coated with 5% phenylmethylsilicone phase, 25 m × 0.2-mm i.d., 0.33-µm film thickness). Helium was used as the carrier gas, and the column head pressure was set at 15 psi. One microliter of each of the samples was injected using the splitless mode with a purge time of 1 min. The injection port and the transfer line were set at 260 and 290°C, respectively. The electron multiplier was set at 150 V above the tune value. Full-scan mass spectra were collected at a rate of 1 scan/s between 50 and 450 amu. The oven temperature was programed from 55°C (initial time of 1 min) to 190°C at a rate of 20°C/min, then heated to 305°C at 10°C/min. The final temperature was maintained during 11 min (total run time of approximately 30 min). Data acquisition and analysis were performed with an HP Vectra XM series 4 5/150 ChemStation using Windows 95 operating software. Data were automatically processed with so-called "macro" programs, using the Pfleger et al. (13), Wiley, and American Academy of Forensic Sciences (AAFS) reference mass spectra libraries and our own databases for tentative mass spectra identification of phenylethylamines. Further unequivocal identification was generally performed by comparing spectra of the unknown with reference spectra of genuine samples obtained under the same conditions.

HPLC–DAD. The quantitation of phenylethylamines was performed by reversed-phase HPLC on a Hewlett-Packard HP 1090 LC interconnected with an HP DAD. Fifty microliters of a ephedrine solution (1 mg/mL in methanol) was added to 100 µL of stock solution of powder (1 mg/mL in methanol) that was diluted with the starting HPLC eluent to 100 µg/mL. Twenty-five microliters of this solution was loaded onto a short enrichment precolumn (Lichrospher RP-8 Select B, 75 mm × 4-mm i.d., 5-µm particle size, Merck, Darmstadt, Germany) over 1.7 min at a flow rate of 0.5 mL/min. The initial mobile phase composition was 5% acetonitrile in 10mM potassium phosphate buffer (pH 3.2). After washing off the salts, sugars, and other impurities, the flow was reversed and then increased to 1 mL/min. The separation of the analytes took place at 40°C on a 25 cm-long Lichrospher RP-8 Select B column (4-mm i.d., 5-µm particle size). The proportion of acetonitrile in the eluent was increased during run from 5 to 60% in 20 min. The eluent was monitored at 210 nm with a window of 44 nm, and full spectra were recorded between 210 and 400 nm. Each column was protected by a Merck RP-8 guard column (4 mm × 4-µm i.d., 5-µm particle size). The calibration curve was obtained with standard solutions of 2C-B at 1, 2, 5, 10, 25, 50, 75, and 100 µg/mL. Each concentration was prepared in duplicate. Standard calibration curves were obtained from unweighted, least squares linear regression analysis of the data. The linearity of the method was statistically tested.

CE. A Hewlett-Packard HP^{3D}CE system was used for the analyses. This system consisted of a CE unit equipped with a DAD, an autosampler, and a high-velocity air-cooled capillary cartridge. The HP^{3D}CE ChemStation software was used for instrument control, data acquisition, and data analysis. The capillary was of fused silica with a 56-cm effective length and a

64.5-cm total length with an inner diameter of 50 µm (375-µm o.d.). Between each run, the capillary was flushed with the electrophoretic buffer for 3 min. Samples (approximately 25 nL) were injected by a positive pressure (1000 mbar.s), and electrophoresis was performed at a constant voltage of 20 kV (approximately 310 V/cm) after a 1-min ramp step. All runs were carried out at 20°C ± 0.1°C (cassette temperature) with a 50mM Tris-phosphate buffer (pH 2.5). Pherograms were monitored at 200 nm (20 nm bandwidth) and a reference signal at 350 nm (100 nm bandwidth). Areas were always corrected by their respective migration time (MT) (12). The calibration curve was performed with standard solutions of 2C-B at 0.5, 0.75, 1, 5, 10, and 15 µg/mL. Each concentration was prepared in duplicate. A standard calibration curve was obtained from unweighted least squares linear regression analysis of the data. The linearity of the method was statistically tested.

Fourier-transform infrared spectroscopy (FTIR). The IR spectroscopy was performed on the residue resulting from liquid–liquid extraction (approximately 2%, w/w) with a PARAGON 500 FTIR (Perkin Elmer, Norwalk, CT) with four scans (16 s) from 4000 to 500 cm^{-1} on a KBr dispersion disk.

NMR. The ^{1}H-NMR and ^{13}C-NMR spectra and the nuclear overhauser exchange spectroscopy (NOESY) experiments were performed on a Bruker AMX 400 MHz. The gs-heteronuclear multiple quantum coherence (HMBC) experiment was performed on a Bruker AMX-2 600 MHz. The residue resulting from liquid–liquid extraction and the reference 2C-B were dissolved in deuterated water (D_2O: 99.95 atom%D) at a concentration of approximately 1.5 mg/mL.

Results and Discussion

Qualitative results

GC–MS. Besides 2C-B, the routine drug screenings performed by GC–MS on the two exhibits revealed the presence of MBDB in sample A and sugars in both samples (Table I). The search for precursors and synthesis impurities remained unsuccessful, suggesting that the psychoactive drugs were carefully purified before being used for making the pills. To our knowledge, it is the first report of the presence of 2C-B in illicit tablets sold in Switzerland. Because many related compounds with similar mass spectra may exist as street drugs, 2C-B was only tentatively identified with our routine GC–MS procedures. The mass spectra of the unknown and of an authentical standard from RBI are shown in Figures 3–6. All mass spectra, underivatized (Figure 3), acetylated (Figure 4), methylated (Figure 5), or of the formyl artifact (Figure 6), of the unknown (see upper parts of the corresponding figures) are almost identical to the reference spectra (lower parts of the figures). The molecular ion (*m/z* 259/261) (Figure 3) and the fragment ions containing one bromine atom were easily identified when based on the nearly equal isotopic ratios of ^{79}Br and ^{81}Br (e.g., 201/203, 215/217, 230/232).

The putative structures of the main fragments are shown in the lower part of Figure 3. Two families of fragments were recognized. The first corresponded to the bromodimethoxy-substituted benzenic ion with a missing part of the partial (*m/z* 230/232) or entire ethylamine side chain (*m/z* 215/217). When the spectrum was scanned between 50 and 450 amu, the ion fragments at *m/z* 230/232 constituted the base peak; otherwise, it was the ion at *m/z* 30 that was the base peak (results not shown). The second ion family was constituted by the unsubstituted aromatic ring (*m/z* 77), toluene (*m/z* 91), phenylethyl (*m/z* 105), and phenylethylamine (*m/z* 121) fragments. The ion pair at *m/z* 199 and 201 could result from the loss of CH_3O from the ion fragments at *m/z* 230 and 232. No fragment that was due to the loss of the bromine atom (*m/z* 79 and 81) from the molecular ions (*m/z* 259 and 261) was detected in a significant amount at *m/z* 180.

The spectra of the unknown acetylated and of the acetylated 2C-B standard are shown in Figure 4. They are almost identical. The base peak (*m/z* 242/244) very likely arose from the loss of the acetylated amine moiety. Loss of the acetylated methylamine side chain (*m/z* 72) should result in the pair of fragments at *m/z* 229 and 231. The loss of bromine from the ion cluster at *m/z* 227 and 229 might result in the prominent fragment at *m/z* 148. No molecular ion could be found following methylation of 2C-B with iodomethane (Figure 5). Otherwise, the mass spectra of the acetylated and of the methylated molecules were very similar with some differences in the relative intensities of the ion fragments. The heaviest ion cluster at *m/z* 242 and 244 very likely resulted from the loss of the dimethylamine moiety. Figure 6 displays the formyl artifact of 2C-B (M^+ *m/z* 271/273), which was probably formed in the injection port of the GC by reaction with formaldehyde and subsequent dehydration (13). The mass spectrum of the unknown (Figure 6, upper part) is very similar to that of the formyl artifact of 2C-B found in the Pfleger et al. (13) database (Figure 6, lower part).

The position of the bromine atom relative to the methoxy groups could not be determined from these comparisons. Therefore, the results shown here indicated that the tablets contained 2C-B or one of its isomeric analogues. The three *ortho* brominated positional isomers of the bromodimethoxyphenylethylamines (Figure 1, compounds G–I) were all characterized by a $(M\text{-}Br)^+$ ion at *m/z* 180 (9), which was lacking in our spectrum.

Thus, in the light of these GC–MS experiments, it could only be concluded that the bromodimethoxyphenylethylamine detected in the seized tablets was bromo-substituted in position *meta* or *para* with regard to the ethylamine side chain (Figure 1, compounds D–F).

FTIR spectroscopy. The IR spectra of the reference and of the analyte presumed to be 2C-B were almost identical. A typical spectrum is shown in Figure 7. The most characteristic bands

Table I. Chemical Composition of the Two Sets of Illicit Tablets

Sample	Weight*	Phenylethylamines	2C-B	Others
A	320 mg	MBDB, 2C-B	5–8 mg	lactose
B	50 mg	2C-B	3–5 mg	galactose, glucose, and lactose

*Approximate weight.

are the broad ammonium band due to $-NH_3^+$ at 3040 cm^{-1}, υ_{st} (C-H aromatic) and υ_{st} (C-H aliphatic) 3050–2850 cm^{-1}, υ_{st} (OCH_3) at 1250 cm^{-1}, and υ_{st} (C-Br) at 740 cm^{-1}. Furthermore the isolated aromatic H gave two sharp weak bands at 825 and 750 cm^{-1}.

UV-visible spectroscopy. UV spectra of the reference and of the phenylethylamine presumed to be 2C-B were recorded by HPLC–DAD and CE–DAD. Both spectra were identical and show a maximum absorbance at 293 nm and a shoulder between 215 and 230 nm (Figure 8). Caffeine, which is a common

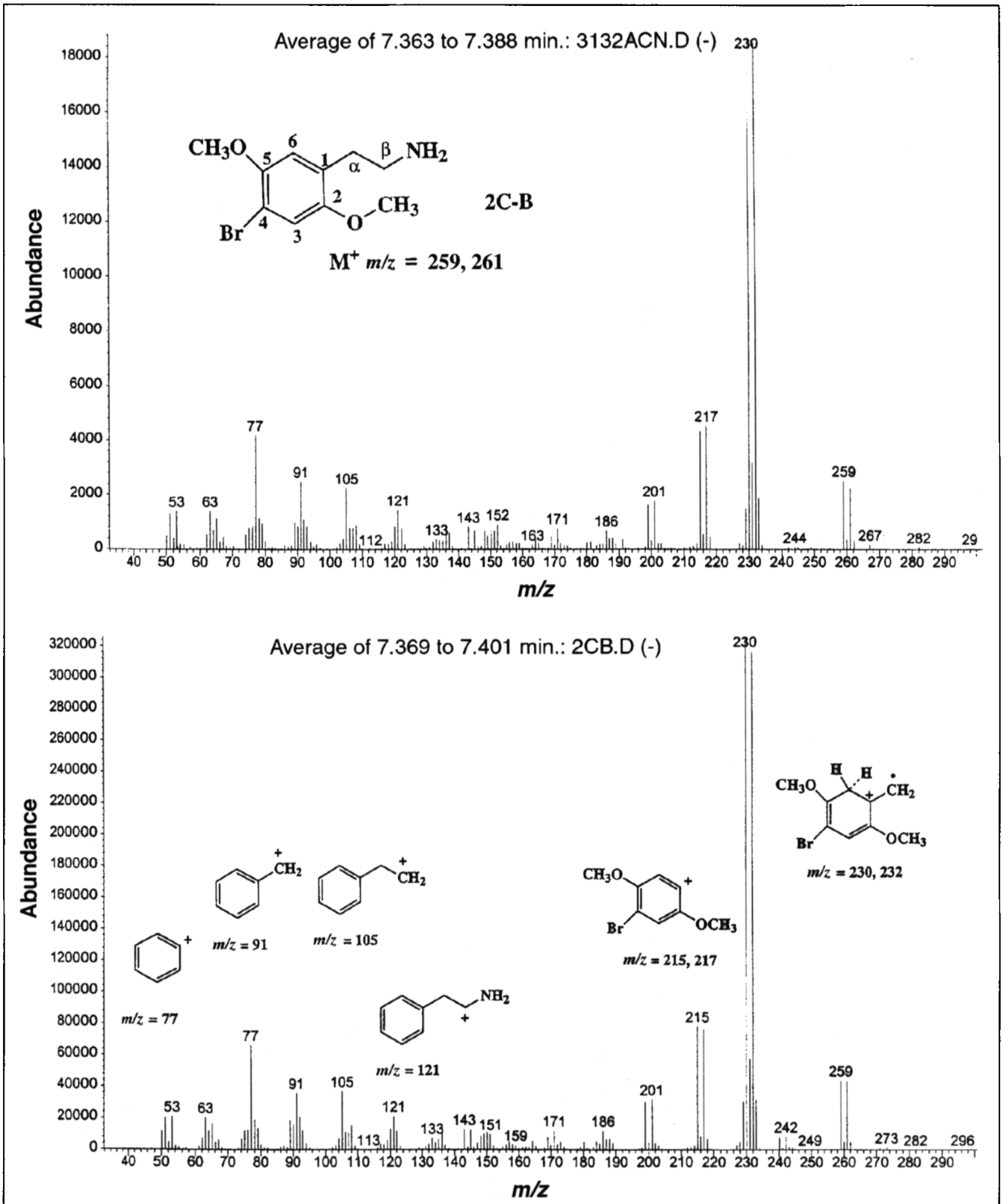

Figure 3. Mass spectra of the unknown (upper part) and of the 2C-B standard (lower part) underivatized.

adulterant in Ecstasy tablets, is also shown on the same figure.

NMR spectroscopy. NMR is a powerful tool in structural determination but has rarely been used in forensic analysis. NMR makes it possible to study the chemical environment of many nuclei, hydrogen and carbon in particular.

One (1D), two (2D), or even more dimensions may be used for experiments. Higher dimensions are used when lower dimensions cannot be interpreted without ambiguity.

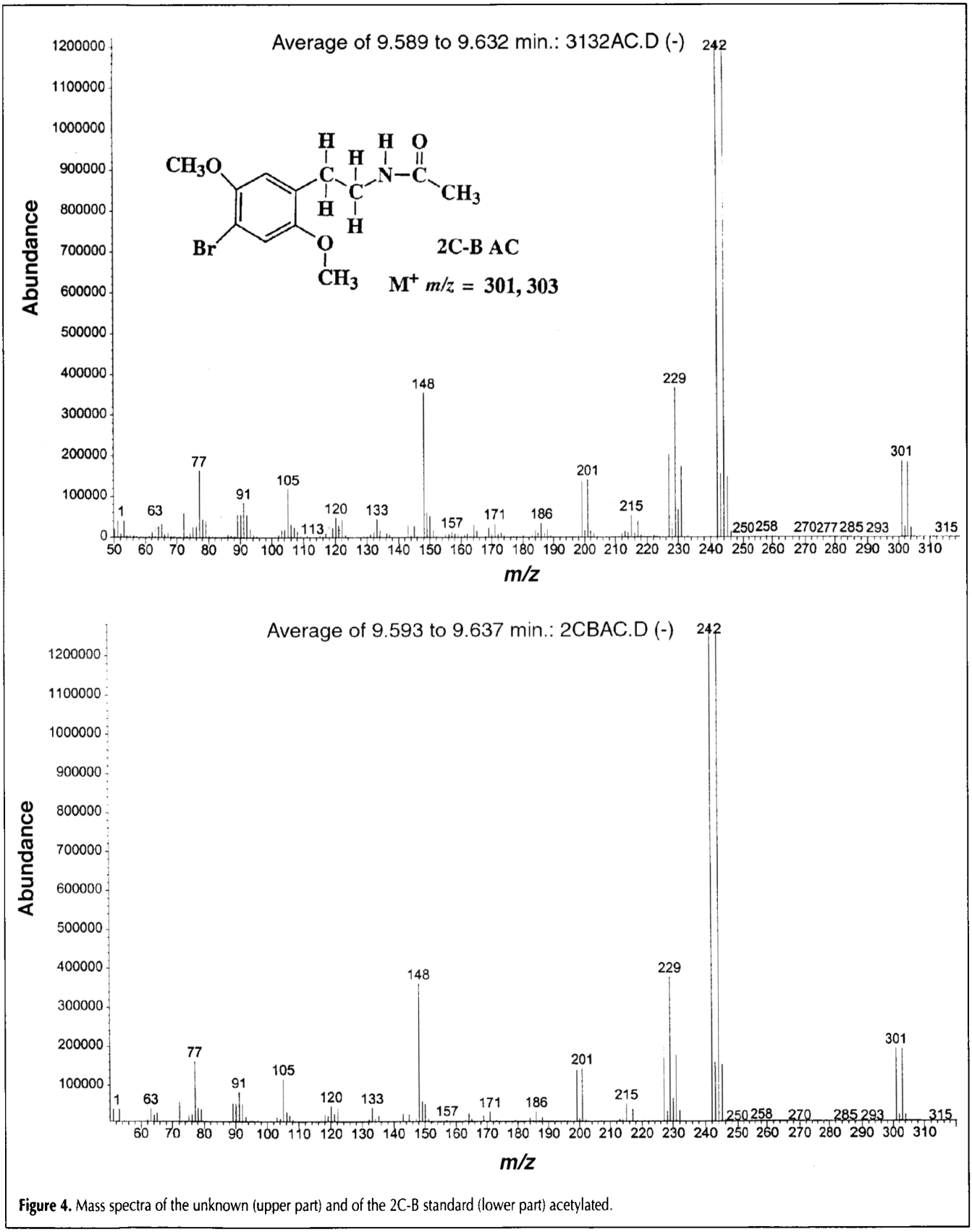

Figure 4. Mass spectra of the unknown (upper part) and of the 2C-B standard (lower part) acetylated.

Furthermore, many different types of experiments, which depend on what is looked for, exist. For example, the connectivity through bonds or scalar coupling between various hydrogens is given by ^{1}H-NMR or correlation spectroscopy (COSY) experiments; or else the connectivity through space or dipolar coupling by NOE (nuclear overauser effect) or NOESY experiments; or the direct or long-range bonding between hydrogen and carbon by 2D heteronuclear experiments.

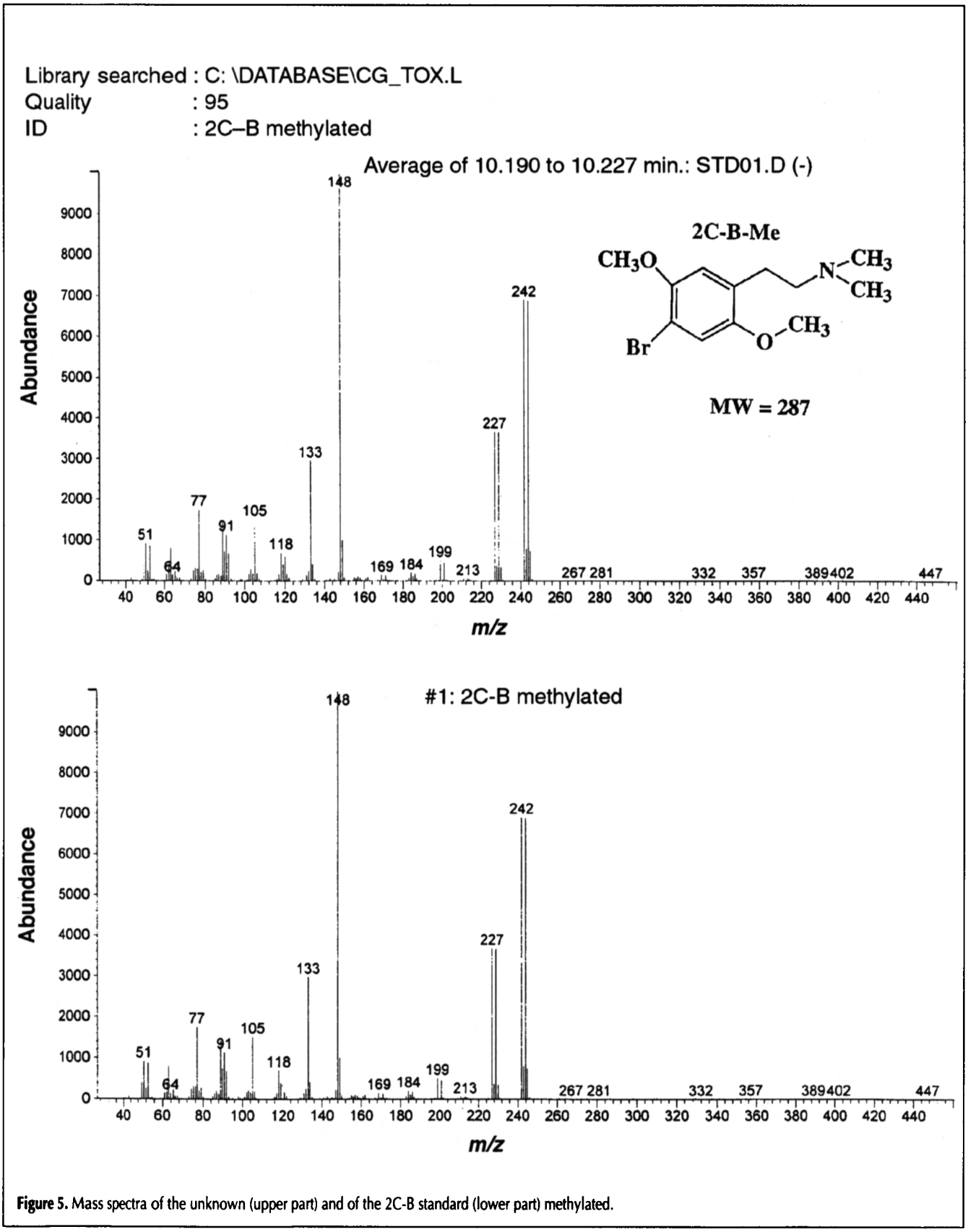

Figure 5. Mass spectra of the unknown (upper part) and of the 2C-B standard (lower part) methylated.

The chemical shifts of the different signals obtained for the ^{1}H-NMR and ^{13}C-NMR spectra of the compound under study, at 400 MHz and 100 MHz, respectively, are as follows: ^{1}H-NMR (400 MHz, D_2O) δ (ppm): 7.17 (s, H-C_3), 6.88 (s, H-C_6), 3.71 (s, MeO-C_5), 3.08 (s, MeO-C_2), 3.08 (t, ^{3}J=7 Hz, CH_2N), 2.84 (t, ^{3}J=7Hz, CH_2) and ^{13}C-NMR (100 MHz, D_2O) δ (ppm): 154.9 (C_2), 152.13 (C_5), 128.11 (C_1) 119.33 (C_3), 118.47 (C_6), 112.46 (C_4), 52.73 (MeO-C_5), 42.15 (MeO-C_2), 42.15 (CH_2N), 30.53 (CH_2).

The ^{1}H-NMR spectra, in D_2O shows two aromatic protons (7.17, 3.88 ppm) in a *para* substitution, since they have no fine structures. There are also two methoxy groups (3.71, 3.68 ppm) and a CH_2CH_2N group. Furthermore, the ^{1}H-NMR and the ^{13}C-NMR show the presence of ethylene glycol at 3.5 ppm

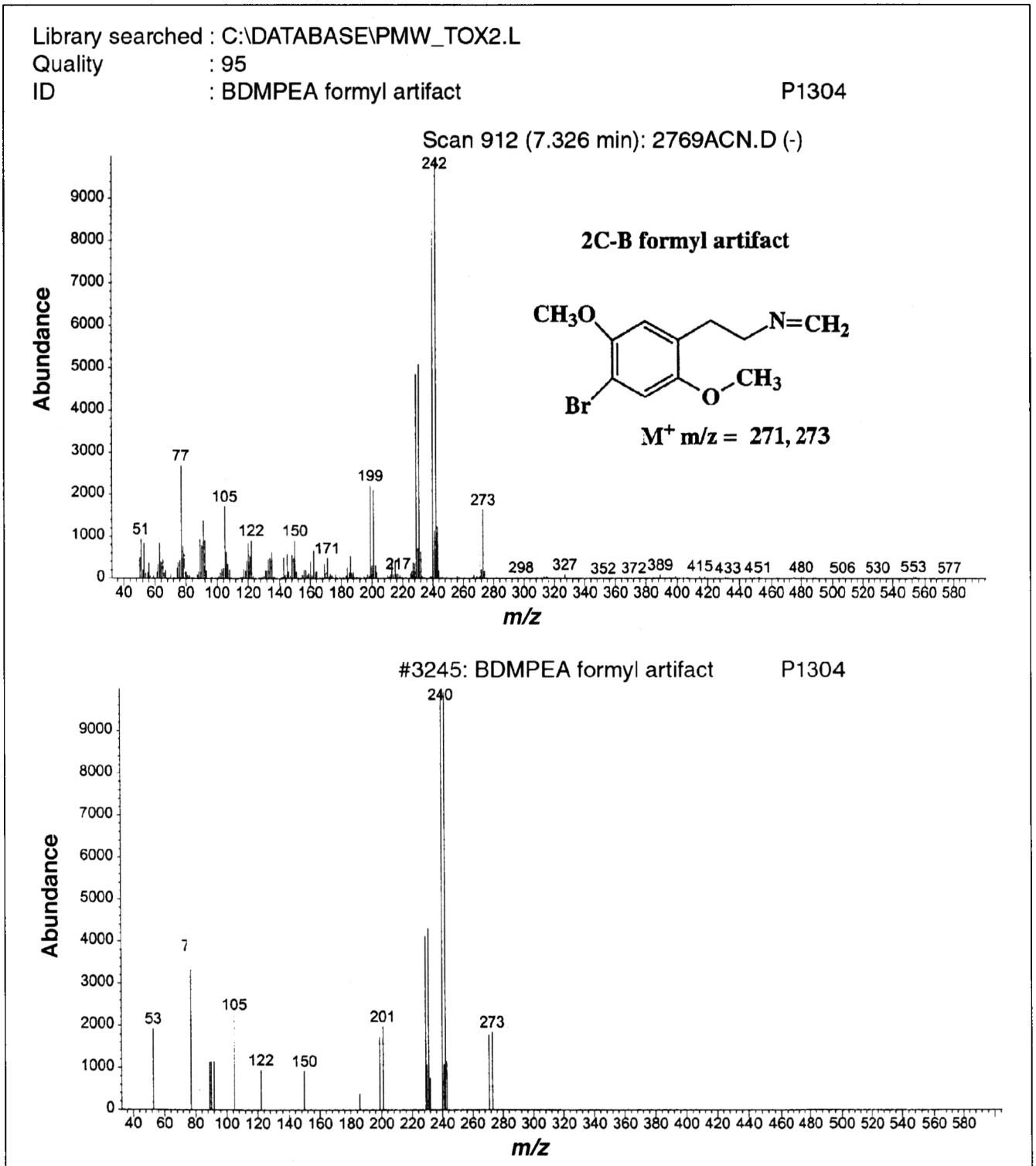

Figure 6. Mass spectra of the unknown (upper part) and of the reference spectrum of the formyl artifact of 2C-B (lower part) from the Pfleger et al. (13) library spectra database.

and 65.33 ppm, respectively. Both spectra permitted to recognize the different functional groups contained in the bromodimethoxyphenylethylamine isomers. These conclusions lead us to propose the structures of compounds D, E, and I in Figure 1 for the suspected 2C-B molecule found in the tablet.

Another NMR experiment, NOESY, was also performed on our compound, and it allowed the connection through space and not through bonds. In this case, there were two possible structures that were compatible with the NMR data (compounds E and I in Figure 1) because both have a methoxy group near one of the two aromatic proton. Therefore, the compound I structure can be neglected with reference to our mass spectrometric data. The structure of the substance found in the tablet corresponds to 2C-B.

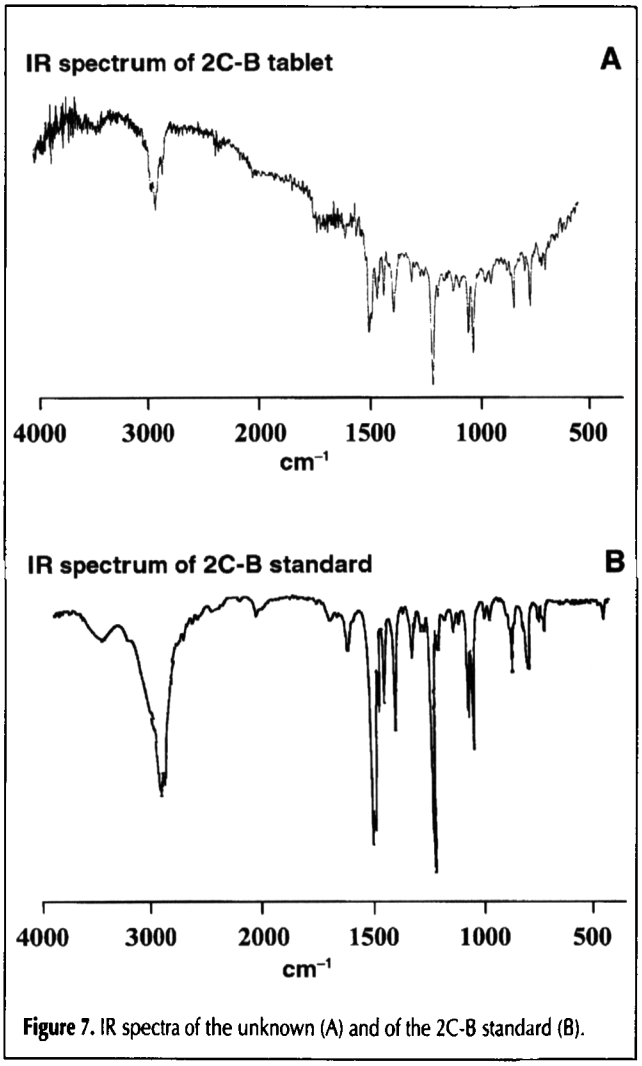

Figure 7. IR spectra of the unknown (A) and of the 2C-B standard (B).

Because more tablets from sample B were available, we decided to perform a particular NMR experiment called HMBC which connects protons and carbons at long range (^2J, ^3J) and permits also an unequivocal determination of its structure. Furthermore, we used the gsHMBC sequence with gradients, which is less time consuming than the usual experiments (COLOC, HMBC). The HMBC spectra (Figure 9) gave us, directly and without ambiguity, the structure of 2C-B only.

In Figure 9, on the top and horizontally, is the hydrogen dimension spectra and, vertically on the left, the ^{13}C dimension spectra. Any "spot" or cross-peak in the two dimension spectra shows a connection between hydrogen and carbon. There are two different types of crosspeaks: those which are doublet and those which are single. The C-H (^1J) signals only appear as a doublet, and all the others (^2J, ^3J) are single crosspeaks. The Ar-CH_2 group shows correlation with CH_2NH_2 and with C_6, C_1, and C_2. Knowing the chemical shift of C_2, we can distinguish the two methoxy groups.

In addition, ^{13}C-NMR and ^1H-NMR spectra simulation matched the structure of 2C-B (results not shown), and ^1H-NMR spectra of 4-bromo-2,5-dimethoxyphenethylamine hydrochloride were identical to our data.

In conclusion, provided that the unknown compound is available in a sufficient amount at a requested purity, gs-HMBC is the experiment of choice that gives, in a simple way, NMR data enabling full structure determination. However, FTIR and/or MS are still needed to demonstrate the presence of the bromine atom in 2C-B.

Quantitative results

2C-B was quantitated in the tablets by HPLC–DAD and CE-DAD. Both methods showed linear responses over the concentration range tested and gave comparable results for both samples. The content of 2C-B varied between 5 and 8 mg per tablet for sample A (4 tablets analyzed) and between 3 and 5 mg per tablet for sample B (10 tablets analyzed). Because of the low number of 2C-B tablets available and the relatively high amount of pure 2C-B needed to perform NMR studies, a full statistical analysis of the data could not be obtained.

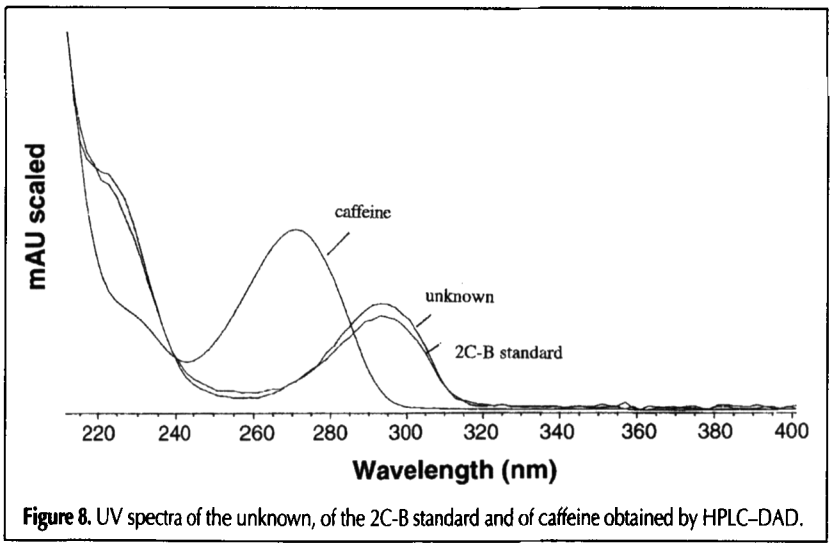

Figure 8. UV spectra of the unknown, of the 2C-B standard and of caffeine obtained by HPLC–DAD.

Conclusion

4-Bromo-2,5-dimethoxyphenylethylamine was unequivocally identified in illicit tablets by

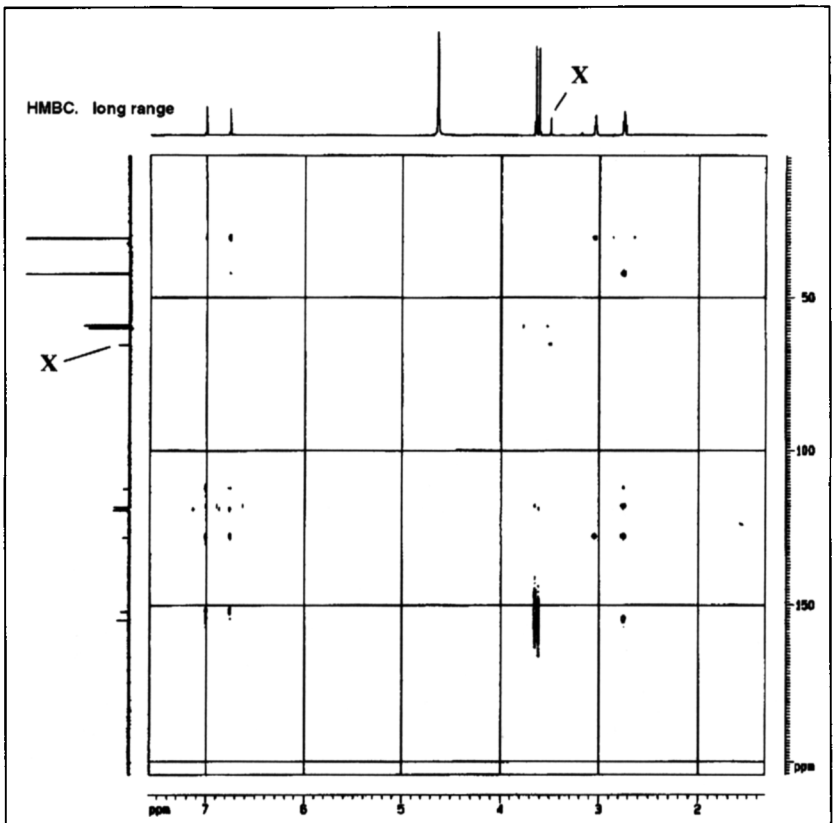

Figure 9. 2C-B spectra, gs-HMBC (600 MHz) in D20. The upper trace corresponds to the ^{1}H-NMR spectrum and the trace on the left-side to the ^{13}C-NMR spectrum. X represents the signal of an impurity (ethylene glycol) that did not interfere with our data.

using a combination of several analytical techniques (GC–MS, FTIR, HPLC–DAD, CE–DAD, and NMR). The bromodimethoxyphenylethyl-amine backbone was recognized by GC–MS, and NMR allowed the complete assignment of the substitution pattern of the benzenic ring. Finally, the amounts of 2C-B in both sets of tablets were in the range of the minimum quantity required to induce the psychoactive effects characteristic of this drug.

Acknowledgments

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References

1. R.A. Glennon, M. Titeler, and R.A. Lyon. A preliminary investigation of the psychoactive agent 4-bromo-2,5-dimethoxyphenethylamine: a potential drug of abuse. *Pharmacol. Biochem. Behav.* **30:** 597–601 (1988).
2. M. Lobos, Y. Borges, E. Gonzales, and B.K. Cassels. The action of the psychoactive drug 2C-B on isolated rat thoracic aorta. *Gen. Pharmacol.* **23:** 1139–1142 (1992).
3. P. Saez, Y. Borges, E. Gonzalez, and B.K. Cassels. α-Adrenergic and 5-HT2-serotonergic effects of some β-phenylethylamines on isolated rat thoracic aorta. *Gen. Pharmacol.* **25:** 211–216 (1994).
4. M.E. Bronson, W. Jiang, J. DeRuiter, and C.R. Clark. A behavioral comparison of nexus, cathinone, BDB, and MDA. *Pharmacol. Biochem. Behav.* **51:** 473–475 (1995).
5. J.T. Cody. Cross-reactivity of amphetamine analogues with Roche Abuscreen radioimmunoassay reagents. *J. Anal. Toxicol.* **14:** 50–53 (1990).
6. J.T. Cody and R. Schwarzhoff. Fluorescence polarization immunoassay detection of amphetamine, methamphetamine, and illicit amphetamine analogues. *J. Anal. Toxicol.* **17:** 26–30 (1993).
7. A.T. Shulgin and M.F. Carter. Centrally active phenethylamines. *Psychopharmacol. Commun.* **1:** 93–98 (1975).
8. A. Shulgin and A. Shulgin. *Pihkal, A Chemical Love Story.* Transform Press, Berkeley, CA, 1992, pp 503–506.
9. F.A. Ragan, S.A. Hite, M.S. Samuels, and R.E. Garey. 4-Bromo-2,5-dimethoxyphenethylamine: identification of a new street drug. *J. Anal. Toxicol.* **9:** 91–93 (1985).
10. J. DeRuiter, C.R. Clark, and F.T. Noggle. Analysis of the bromination products of the isomeric dimethoxyphenethylamines: differentiation of <<Nexus >> from five positional isomers. *Microgram* **XXX 5:** 96-111 (1997).
11. D. Delliou. 4-Bromo-2,5-dimethoxyamphetamine: psychoactivity, toxic effects and analytical methods. *Forensic Sci. Int.* **21:** 259–267 (1983).
12. K.D. Altria, Essential peak area normalization for quantitative impurity content determination by capillary electrophoresis, *Chromatographia* **35:** 177–182 (1993).
13. K. Pfleger, H.H. Maurer, and A. Weber. *Mass Spectral and GC Data of Drugs, Poisons, Pesticides, Pollutants and their Metabolites,* Vol. 1. VCH, New York, NY, 1992, p 22.

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