

# Microgram

## *Bulletin*

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- JUNE 2006 -

**- INTELLIGENCE ALERT -**

**FENTANYL SOLD AS COCAINE IN LAKE COUNTY, OHIO**

The Lake County Crime Laboratory (Painesville, Ohio) recently received a plastic baggie containing an inhomogeneous white powder, suspected to be cocaine but later alleged by the suspect to possibly be crushed Vicodin® (see Photo 1). The exhibit was seized by a Lake County Deputy Sheriff from the floor of a gas station restroom in Painesville, where the male subject had been discovered unresponsive and struggling to breathe (subsequent investigation revealed that he was a cocaine addict and was in a drug rehab program). Analysis of the homogenized powder (total net mass 0.71 grams) by GC/MS and FTIR, however, indicated not cocaine or hydrocodone (i.e., Vicodin®) but rather 23 percent fentanyl, 0.7 percent despropionyl fentanyl, trace (0.1 percent) cocaine, and 62 percent mannitol. This was the first such submission to the Lake County Crime Laboratory.



**Photo 1**

[Editor's Notes: Although there have been multiple anecdotal reports of cocaine/fentanyl mixtures during the ongoing epidemic of heroin/fentanyl-related overdoses and deaths, this is the

first such case reported to *Microgram Bulletin*. However, the analyst suspects that the trace cocaine in the exhibit may actually have been the result of contamination either from reuse of the plastic baggie, or by the distributor during formulation (i.e., it was not intended to be a cocaine/fentanyl mixture). No information was available as to the source of the material. Creatine monohydrate and Seroquel® (a prescription antipsychotic) were also seized from the subject's vehicle. The percent fentanyl in this case (23 percent) was extraordinarily high for a "street sample"; however, due to early discovery and rapid emergency response, the subject survived.]

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**- INTELLIGENCE ALERT -**

**HIGH PURITY FENTANYL SEIZED NEAR WESTMORELAND, CALIFORNIA**

The DEA Southwest Laboratory (Vista, California) recently received a multi-exhibit submission consisting of: A) 31 packages of an off-white crystalline material wrapped in brown tape and multiple layers of plastic and grease, suspected methamphetamine; B) a plastic container that also contained the same off-white crystalline material, also suspected methamphetamine; C) a clear plastic ziplock bag containing a loose white powder, suspected cocaine; and D) a package containing a semi-compressed white material wrapped in layers of plastic and brown tape, also suspected cocaine (see Photo 2 for the two suspected cocaine exhibits).



**Photo 2 (Case Information Obscured)**

The exhibits were seized by U.S. Border Patrol Agents from a vehicle transiting the California Highway 86 checkpoint north of Westmoreland, California. Analysis of the suspected methamphetamine exhibits (total net mass 13.85 kilograms) by GC, ATR, GC/MS, and LC confirmed 95 percent d-methamphetamine hydrochloride. Analysis of the suspected cocaine exhibits (total net mass 945.1 grams) by GC, ATR, GC/MS, and LC, however, indicated not cocaine but rather 83 percent fentanyl hydrochloride. The immediate precursor 4-anilino-N-phenethylpiperidine (ANPP) was also identified in the sample (quantitation not reported). The Southwest Laboratory has analyzed numerous fentanyl-containing and related exhibits from two clandestine laboratories recently seized in southern California; however, these exhibits are believed to have originated in Mexico.

[Editor's Notes: This seizure has been widely reported, and is of concern to front-line law enforcement and laboratory personnel due to the potentially serious health consequences resulting from fentanyl exposure. The salt form and presence of ANPP confirm that the fentanyl in the case was clandestinely manufactured, and its extraordinarily high purity indicates production by an experienced laboratory operator. It is suspected that this individual is the source for the fentanyl responsible for the ongoing epidemic of heroin/fentanyl-related overdoses and deaths in the northeastern and upper mideastern United States.

**- INTELLIGENCE ALERT -**

**ECSTASY TABLETS CONTAINING MDMA AND 3,4-METHYLENEDIOXY-DIMETHYLAMPHETAMINE (MDDMA) IN JOHNSON COUNTY, KANSAS**

The Johnson County Sheriff's Office Criminalistics Laboratory (Mission, Kansas) recently received a multi-exhibit submission consisting of: A) three bags of white powder (confirmed cocaine); B) two red, round tablets with an apple logo (confirmed MDMA); and C) two and one half white, round tablets with a stylized "X" (cross or crossbones) logo, suspected MDMA (see Photo 3). The exhibits were seized by the Mission Police Department pursuant to a DUI traffic stop in Mission. The "X" tablets were approximately 8 millimeters in diameter by 4 millimeters in thickness, and were rather crudely manufactured (average weight not obtained, but typical of Ecstasy tablets). Analysis by GC/MS confirmed primarily MDMA, but also a small amount of 3,4-methylenedioxydimethylamphetamine (MDDMA) and caffeine, in an approximate 100 : 3 : 1 ratio based on the TIC. MDDMA is a structural isomer of 3,4-methylenedioxyethylamphetamine (MDEA); therefore, the identification was confirmed via comparison with an authentic standard provided by the DEA. The MDMA was not formally quantitated, but the loading appeared to be typical of Ecstasy tablets. These were the first confirmed tablets containing MDDMA, and also the first tablets with the stylized "X" logo, submitted to the laboratory.



**Photo 3**

[Additional Information: As noted above, MDDMA and MDEA are closely related structural isomers; therefore, their GC retention times and mass spectra are expected to be similar. In fact, using an HP-5MS column and the laboratory's standard MDMA analysis parameters, the retention times only differed by approximately 0.1 minutes. Both mass spectra display a small molecular ion at  $m/z = 206$ , and are dominated by the parent ion at  $m/z = 72$ . The most significant differences between the two compounds are the 44 and the 135 ions. MDDMA has 44 and 135 ions at approximately 2% and 3% relative to the 72 ion, while MDEA has 44 and 135 ions at approximately 11% and 9% relative to the 72 ion. There is also an absence (or near absence) of a 95 ion in the MDEA spectrum. The full scale and expanded mass spectra of MDDMA and MDEA are displayed on the next two pages.]

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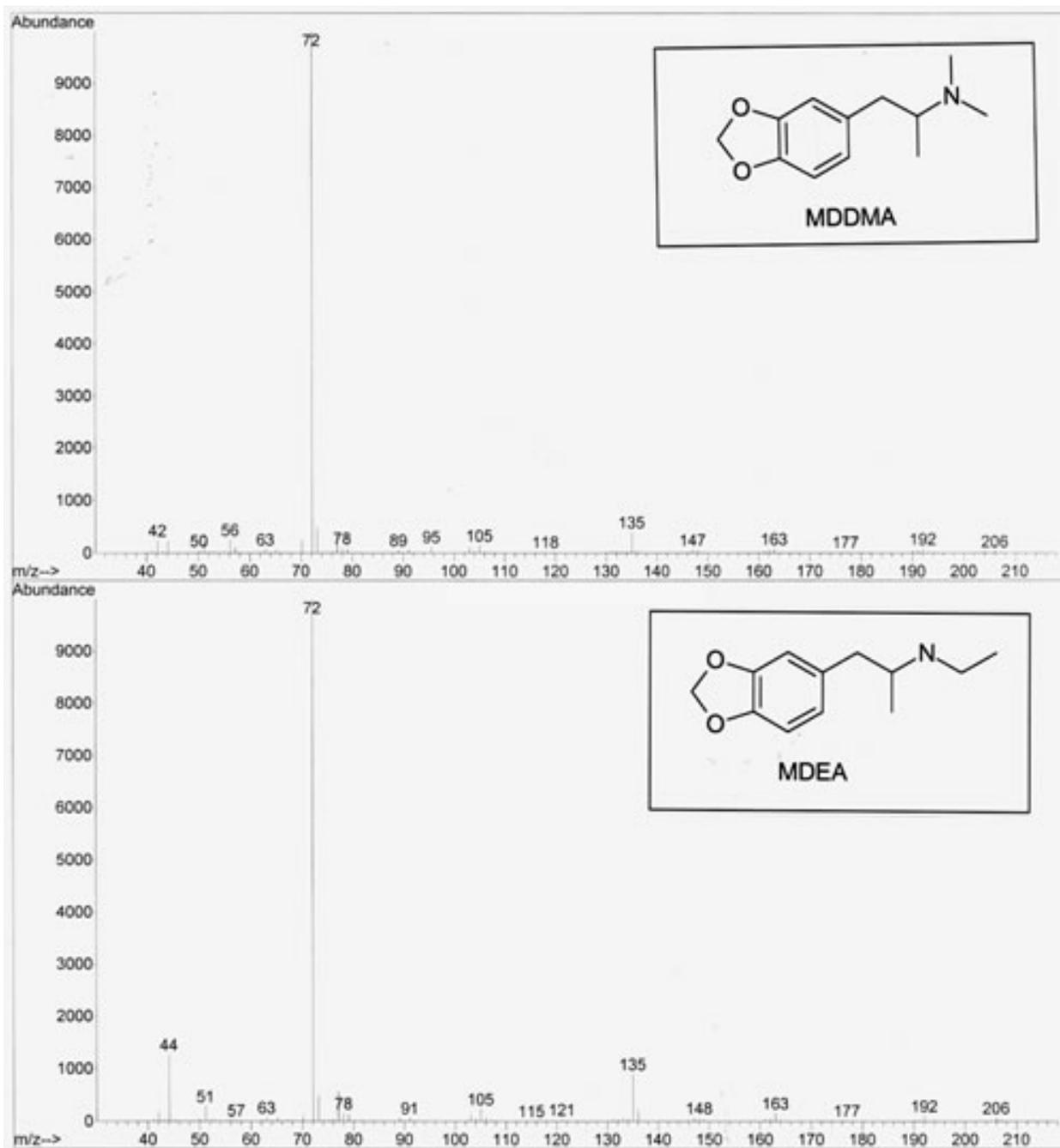
**- INTELLIGENCE ALERT -**

**HEROIN CAPSULES IN NEW HAMPSHIRE**

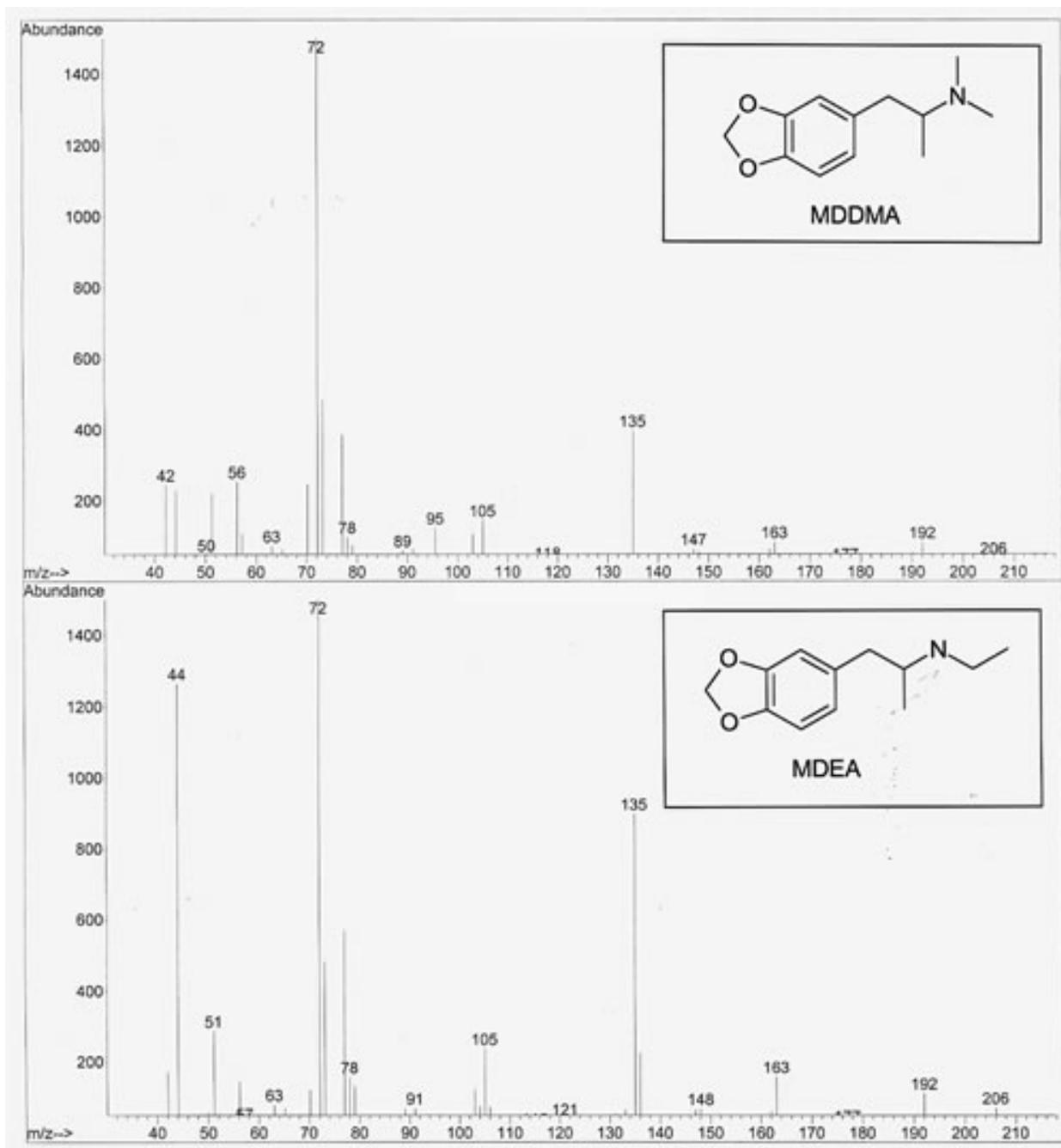
The New Hampshire State Police Forensic Laboratory (Concord) recently received a multi-exhibit submission consisting of: A) hand rolled cigarettes containing marijuana; B) pharmaceutical tablets containing hydrocodone and acetaminophen; C) pharmaceutical tablets containing oxycodone and acetaminophen; and D) 20 clear capsules containing a light brown powder, unknown/suspected controlled substance (photo not taken). The exhibits were seized by

the New Hampshire Drug Task Force in central New Hampshire (exact locale and circumstances of seizure not available). The capsules were 23 millimeters long and 9 millimeters in diameter. Analysis of the powder (total net mass 5.32 grams) by color testing (Marquis), UV, GC, and GC/MS identified heroin, promethazine, procaine, and caffeine (not formally quantitated, but in approximately a 100 : 50 : 10 : 10 ratio). This was the first such submission to the laboratory.

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**FULL SCALE MASS SPECTRA OF MDDMA AND MDEA**



**EXPANDED SCALE MASS SPECTRA OF MDDMA AND MDEA**

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[Editor's Notes: For a recent article on MDDMA and MDEA, see: Vande Castele SR. LC-MS/MS in the elucidation of an isomer of the recreational drug methylenedioxyethylamphetamine: Methylenedioxydimethylamphetamine. *Journal of Separation Science* 2005;28:1729. For a recent case report of tablets containing MDDMA, see: Anonymous. Ecstasy Mimic Tablets (Containing Caffeine, Methamphetamine, Lidocaine, and an Unknown Phenethylamine) in Broward County, Florida. *Microgram Bulletin* 2006;39(2):18.]

**- INTELLIGENCE ALERT -**

**LSD BLOTTER ACID MIMICS (CONTAINING 2,5-DIMETHOXY-4-CHLORO-AMPHETAMINE (DOC)) IN BOCA RATON, FLORIDA**

The Palm Beach County Sheriff's Office (West Palm Beach, Florida) recently received 32 off-white, 1/4 inch square pieces of blotter paper (total net mass 0.36 grams), suspected LSD (photo not available). The exhibits were acquired in Boca Raton by the Boca Raton Police Department. Although typical of LSD blotter acid in appearance, the paper did not fluoresce under UV, and methanolic extracts spotted on filter paper did not give the characteristic purple color when treated with Ehrlich's reagent (PDAB). Further analysis of the methanolic extracts by GC and GC/MS indicated not LSD but rather 2,5-dimethoxy-4-chloroamphetamine, also known as DOC (not quantitated, but a fairly high loading based on the gas chromatogram). This is the first ever submission of DOC to the laboratory.

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**- INTELLIGENCE ALERT -**

**COCAINE IN WICKER BASKETS (FROM PERU) AT THE GEORGE BUSH INTERCONTINENTAL AIRPORT, HOUSTON, TEXAS**

The Houston Police Department Crime Laboratory (Texas) recently received 38 well-crafted decorative wicker baskets (three different sizes) suspected to contain cocaine (see Photo 4). The baskets were shipped as air freight on a flight arriving at the George Bush Intercontinental Airport from Peru, and were seized in a combined operation by Immigration and Customs Enforcement (ICE) personnel and the Houston Police Department. The vertical supports in the baskets actually consisted of plastic drinking straws wrapped with wicker-colored paper and capped at both ends with genuine wicker plugs, to give them an authentic appearance; each straw contained a fine white powder (see Photo 5, next page). There were approximately 200 straws in all, containing a total net weight of 12.3 kilograms of powder. Analysis by GC/MS, FTIR-ATR, and UV/Vis confirmed 76 percent cocaine hydrochloride. Unusually, the cocaine in (only) the smaller baskets was also adulterated with lidocaine (not quantitated). This was the first such submission to the laboratory.



**Photo 4**

[Editor's Notes: This seizure is somewhat similar to one reported in the February 2006 issue of *Microgram Bulletin*. In that case, the cocaine was contained in plastic sleeves that were wrapped

with brightly colored cloths, which were then used as the wickers for the basket. Those baskets arrived at the Miami International Airport on a flight from Haiti.]



**Photo 5**

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**- INTELLIGENCE ALERT -**

**COCAINE IN BAMBOO STICKS (FROM GUYANA) AT JFK AIRPORT, NEW YORK**

The DEA Northeast Laboratory (New York, New York) recently received 73 bamboo sticks, each about 1 foot long, each containing a white powder, suspected cocaine (see Photo 6). The exhibits were shipped from Guyana, and were seized by Immigration and Customs Enforcement personnel at the JFK Airport mail handling facility. Analysis of the powder (total net mass 876.9 grams) by GC/FID, GC/MS, and FT-IR/ATR confirmed 78 percent cocaine hydrochloride, adulterated with methylephedrine and diltiazem (adulterants not quantitated). The Northeast Laboratory routinely receives cocaine concealed in a wide variety of containers, but this was the first ever submission of a controlled substance in bamboo sticks. It is unknown what (if anything) the sticks were supposed to be.



**Photo 6**

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**- INTELLIGENCE ALERT -**

**HEROIN IN FALSE CAPACITORS IN COMPUTER POWER UNITS (FROM VENEZUELA) AT MIAMI INTERNATIONAL AIRPORT, FLORIDA**

The DEA Southeast Laboratory (Miami, Florida) recently received 35 computer power units, each containing 8 apparent capacitors attached to their internal circuit boards, each of which contained a light brown powder, suspected heroin (see Photos 7 and 8). The exhibits were seized by Immigration and Customs Enforcement personnel from an international shipping company flight arriving at Miami International Airport from Caracas, Venezuela. Unusually, the power units were intact and appeared to be functional, despite the installation of the false capacitors. The powder (total net mass 4.928 kilograms in 256 capacitors) was wrapped in plastic before insertion into the capacitors, and each capacitor was then sealed with wax. Analysis by GC/MS and FTIR confirmed 75 percent heroin hydrochloride. This is the first such submission to the Southeast Laboratory.

[Editor's Note: A very similar submission was reported in the June 2004 issue of *Microgram Bulletin*. In that case, nine large capacitors that were attached to a circuit board were also found to contain heroin (in this latter case, the circuit board was standalone - not enclosed in anything else). At least two more of these circuit boards were seized subsequent to the initial report. Similar to the current seizure, all three of the circuit board/capacitor units in those cases were seized off flights arriving from Venezuela (in those cases, to the airport in Philadelphia). In addition, a somewhat similar submission was reported in the March 2002 issue of *Microgram* (note that this issue is law enforcement restricted). In that seizure, "metallic tubes" (similar in appearance to large capacitors) containing heroin were found inside a CPU case. That seizure was made within New York City (not at an airport), and the original source of the CPU case was not reported.]



**Photo 7**



**Photo 8**

**- INTELLIGENCE ALERT -**

**ECSTASY MIMIC TABLETS (CONTAINING AMPHETAMINE SULFATE)  
IN GULFPORT, MISSISSIPPI**

The DEA South Central Laboratory (Dallas, Texas) recently received eight 1.5 quart plastic bags containing a total of 17,290 rather poorly manufactured, white, round tablets with a faint “Tasmanian Devil” logo, suspected MDMA (see Photos 9 and 10). The bags had been hidden in a large pipe inside an abandoned storage unit in Gulfport, Mississippi, and were seized by a local Task Force Officer. The tablets were approximately 11 millimeters in diameter and 2.5 millimeters in width, and had an average weight of 248 milligrams. Analysis by NMR, GC/MS, FTIR, and HPLC, however, indicated not MDMA but rather amphetamine sulfate (38 milligrams per tablet). The salt form and lack of clandestine manufacturing impurities indicate that the amphetamine in this case was very likely diverted from pharmaceutical stocks. Although the DEA laboratory system has previously received tablets containing amphetamine sulfate, this is an unusually large seizure of such tablets, especially for the South Central Laboratory.



**Photo 9**



**Photo 10**

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**- INTELLIGENCE BRIEF -**

**KHAT NEAR TOLEDO, OHIO**

The Ohio State Highway Patrol Crime Laboratory (Columbus, Ohio) recently received two black pieces of luggage and two red duffel bags, containing in total 490 leaf-wrapped bundles of plant material, presumed khat (photo not available). The exhibits were seized by the Findlay District Patrol Headquarters - Criminal Patrol Unit pursuant to a traffic stop on I-80 West near Toledo. The plant material (total net mass 42.74 kilograms) was frozen upon arrival at the laboratory to prevent conversion of cathinone to cathine while awaiting workup. After methanolic extraction, standard acid/base workup, and back-extraction with butyl chloride, analysis by GC/FID and GC/MS identified cathinone and cathine, confirming khat (not quantitated). This was the second large submission of khat to the laboratory this year.

## SELECTED REFERENCES

[Selected references are a compilation of recent publications of presumed interest to forensic chemists. Unless otherwise stated, all listed citations are published in English. Listed mailing address information exactly duplicates that provided by the abstracting service. Patents and Proceedings are reported only by their *Chemical Abstracts* citation number.]

1. Amini A, Barclay V, Rundlof T, Jonsson S, Karlsson A, Arvidsson T. **Determination of ephedrine, pseudoephedrine, and caffeine in a dietary product by capillary electrophoresis.** *Chromatographia* 2006;63(3-4):143. [Editor's Notes: Presents the title study (two different CE methods were used). Contact: Med Prod Agcy, Box 26, Dag Hammarskjolds Vag 42, S-75103 Uppsala, Sweden.]
2. Awad T, Clark CR, DeRuiter J. **Chromatographic and mass spectral studies on methoxymethcathinones related to 3,4-methylenedioxymethamphetamine.** *Journal of Chromatographic Science* 2006;44(3):155. [Editor's Notes: Abstract not available. Contact: Auburn Univ, Sch Pharm, Dept Pharmacol Sci, Auburn, AL 36849.]
3. Berteau CM, Luciano P, Bossi S, Leoni F, Baiocchi C, Medana C, Azzolin CMM, Temporale G, Lombardozzi MA, Maffei ME. **PCR and PCR-RFLP of the 5S-rRNA-NTS region and salvinorin A analyses for the rapid and unequivocal determination of *Salvia divinorum*.** *Phytochemistry* 2006;67:371. [Editor's Notes: HPLC/MS and DNA fingerprinting were used to differentiate between *Salvia divinorum* and *Salvia officinalis*. Contact: Department of Analytical Chemistry, University of Turin, Via P. Giuria 5, 10125 Turin, Italy.]
4. Burnett A, Fan W, Upadhyaya P, Cunningham J, Linfield E, Davies G, Edwards H, Munshi T, O'Neil A. **Analysis of drugs-of-abuse and explosives using terahertz time-domain and Raman spectroscopy.** (Proceedings) *Chemical Abstracts* 2006:300182.
5. Dixon SJ, Brereton RG, Carter JF, Sleeman R. **Determination of cocaine contamination on banknotes using tandem mass spectrometry and pattern recognition.** *Analytica Chimica Acta* 2006;559(1):54. [Editor's Notes: Presents the title study. The technique aids in discriminating cases of "background" contamination from genuine case contamination. Contact: Centre for Chemometrics, School of Chemistry, University of Bristol, Cantocks Close, Bristol, UK BS8 1TS.]
6. Heegel RA, Northrop DM. **"One-Pot" methamphetamine manufacture via the lithium-ammonia method with multi-ingredient, liquid, and/or soft-gel pseudoephedrine preparations.** *Journal of the Clandestine Laboratory Investigating Chemists Association* 2006;16(1):25. [Editor's Notes: Details withheld in accordance with *Microgram* policy. Note that *JCLICA* is a law enforcement restricted journal. Contact: Washington State Patrol, Marysville Crime Laboratory, 2700 116th Street, NE Suite P, Marysville, Washington 98271.]
7. Leger MN, Ryder AG. **Comparison of derivative preprocessing and automated polynomial baseline correction method for classification and quantification of narcotics in solid mixtures.** *Applied Spectroscopy* 2006;60(2):182. [Editor's Notes: Presents the title study, focusing on Raman spectroscopy of "illegal narcotics" (cocaine, heroin, and MDMA are specifically mentioned in the abstract). Contact: Department of Chemistry and National Centre for Biomedical Engineering Science, National University of Ireland-Galway, Galway, Ire.]
8. Love DW, Orlando PM. **Examining the specificity of anhydrous ammonia analytical techniques.** *Journal of the Clandestine Laboratory Investigating Chemists Association*

- 2006;16(1):14. [Editor's Notes: A comprehensive overview of methods for both the presumptive and rigorous identification of anhydrous ammonia. Note that *JCLICA* is a law enforcement restricted journal. Contact: DEA Southwest Laboratory, 2815 Scott St., Vista, CA 92081.]
9. Medana C, Massolino C, Pazzi M, Balocchi C. **Determination of salvinorins and divinorins in *Salvia divinorum* leaves by liquid chromatography/multistage mass spectrometry.** Rapid Communications in Mass Spectrometry 2006;20:131. [Editor's Notes: Presents the title study; six salvinorins and three divinorins were isolated and characterized. Contact: Dipartimento di Chimica Analitica, Universita degli Studi di Torino, Via P. Giuria 5, 10125 Torino, Italy.]
  10. Moorehead W. **Practical identity using microcrystal tests.** Microscope 2005;53(2):73. [Editor's Notes: A review, emphasizing the benefits of using microcrystal tests (focusing on analysis of drugs). Contact: Orange County Sheriff - Coroner Department, Santa Ana, CA 92703.]
  11. Noppe H, Voelmans S, Verheyden K, De Brabander H, Van Hoof N. **Current studies in residue analysis methodology.** Vlaams Diergeneeskundig Tijdschrift 2005;74(5):340. [Editor's Notes: A review of residue analyses, focusing on controlled substances. This article is written in Dutch. Contact: Onderzoeksgroep Veterinaire Volksgezondheid en Zoonosen, Vakgroep Veterinaire Volksgezondheid en Voedselveiligheid, Laboratorium voor Chemische Analyse, Faculteit Diergeneeskunde, Universiteit Gent, B-9820 Merelbeke, Belg.]
  12. Ogawa Y, Shibuya T, Otani C, Kawase K. **Inspection of illicit drugs in envelopes using terahertz imaging.** Hikari Araiatsu 2006;17(2):12. [Editor's Notes: Presents the title study; methamphetamine and cocaine are specifically cited in the abstract. This article is written in Japanese. Contact: Grad. Sch. Agric., Tohoku University, Sendai, Japan 981-8555.]
  13. Pacifico D, Miselli F, Micheler M, Carboni A, Ranalli P, Mandolino G. **Genetics and marker-assisted selection of the chemotype in *Cannabis sativa* L.** Molecular Breeding 2006;17(3):257. [Editor's Notes: The cannabinoid content of various samples was determined by GC, and the results compared with the samples' chemotypes. Contact: Istituto Sperimentale per le Colture Industriali, Via di Corticella 133, Bologna 40128, Italy.]
  14. Panno BA, Johnson P, Aide M, Fasnachi MP. **Using Li+ extracted from soils at clandestine methamphetamine labs to estimate methamphetamine production.** Journal of the Clandestine Laboratory Investigating Chemists Association 2006;16(1):7. [Editor's Notes: Presents the title study. Note that *JCLICA* is a law enforcement restricted journal. Contact: Southeast Missouri State University, Chemistry Department, Cape Girardeau, MO 63701.]
  15. Sleeman R, Carter J, Ebejer K. **Drugs on money and beyond: Tandem mass spectrometry in the forensic sciences.** Spectroscopy Europe 2005-2006;17(6):10. [Editor's Notes: A minor review. Contact: Mass Spec Analytical Ltd., Filton, Bristol, UK BS99 7AR.]
  16. Sleeman R, Carter J, Ebejer K. **Comments on: Esteve-Turillas FA, et al. Validated, non-destructive, and environmentally friendly determination of cocaine in euro bank notes.** (Journal of Chromatography A 2005;1065(2):321.) Journal of Chromatography A 2006;1108(2):285; and response by the authors: Journal of Chromatography A 2006;1108(2):287.)
  17. Souverain S, Geiser L, Rudaz S, Veuthey JL. **Strategies for rapid chiral analysis by capillary electrophoresis.** Journal of Pharmaceutical and Biomedical Analysis 2006;40(2):235. [Editor's Notes: Presents the title study, with the objective of reducing analysis times. Substrates included

amphetamine and four “related compounds” (unspecified in the abstract). Contact: Univ Geneva, Sch Pharmaceut Sci, Lab Pharmaceut Analyt Chem, Bd Yvoy 20, CH-1211 Geneva 4, Switzerland.]

18. Vandrish G, Nguyen DH, Berry S, Klymowsky C, Parent M, Locquaio S. **Multi-zonal detection of explosives, narcotics, and other chemical substances.** (Patent) Chemical Abstracts 2006:359669.
19. Wu G, Cai X, Xiang B. **Forensic identification of ecstasy (MDMA) by pattern recognition.** Zhongguo Yaoke Daxue Xuebao 2005;36(2):150. [Editor’s Notes: Uses GC/MS and SIMCA to identify synthetic routes for MDMA. This article is written in Chinese. (This article appears to be quite similar to another article by the same authors: Identification of synthesis routes of “Ecstasy” by GC-MS coupled soft independent modeling of class analogies. Sepu 2005;23(2):214.) Contact: Center for Instrumental Analysis, China Pharmaceutical University, Nanjing 210009, Peop. Rep. China.]
20. Zgonjanin DM, Loncar ES, Tasic MM. **Analysis of forensic samples of “Ecstasy” tablets seized in Novi Sad during the 2004 year.** Acta Periodica Technologica 2005;36:247. [Editor’s Notes: Presents the title study. 121 different type tablets from 93 separate seizures were analyzed, using a variety of techniques. Contact: Clinical Centre Novi Sad, Institute of Forensic Medicine, Novi Sad 21000, Serbia and Montenegro.]

#### **Additional References of Possible Interest:**

1. Hollifield JM. **Flow chart for the rapid identification of inorganic compounds using PLM.** Microscope 2005;53(3):99. [Editor’s Notes: Presents the title study. Contact: Micro Analytical, Greenville, SC 29609.]
2. Mroczek T, Glowniak K, Kowalska J. **Solid-liquid extraction and cation-exchange solid-phase extraction using a mixed-mode polymeric sorbent of Datura and related alkaloids.** Journal of Chromatography A 2006;1107(1-2):9. [Editor’s Notes: Presents the title study, focusing on scopolamine and hyoscyamine. Contact: Med Univ Lublin, Dept Pharmacognosy, 1 Chodzki St, PL-20093 Lublin, Poland.]
3. Pjilman FTA, Rigter SM, Hoek J, Goldschmidt HMJ, Niesink RJM. **Strong increase in total delta-THC in cannabis preparations sold in Dutch coffee shops.** Addiction Biology 2005;10(2):171. [Editor’s Notes: Presents the title study, for 2004. Contact: Trimbos Institute for Mental Health and Addiction, 3500 AS Utrecht, Neth.]
4. Reffner JA. **Infrared microprobe analysis using reflection methods.** Microscope 2005;53(1):33. [Editor’s Notes: A review. Contact: Smiths Detection, Stamford, CT 06902.]
5. Seto Y. **Alkyl nitrites.** Drugs and Poisons in Humans 2005:153. [Editor’s Notes: A review; includes methods for analysis of alkyl nitrites. Contact: National Research Institute of Police Science, Chiba, Japan.]
6. Skulska A, Kala M, Parczewski A. **Fentanyl and its analogues in the forensic laboratory. Medical and analytical problems.** Z Zagadnien Nauk Sadowych 2004;59:127. [Editor’s Notes: An overview. Focus is analysis in complex biological matrices. Contact: Faculty of Chemistry, Jagiellonian University, Krakow, Poland.]

7. Sproll C. **New methods of morphine analysis in food. No intoxication from poppy cake.** CLB Chemie in Labor und Biotechnik 2005;56(10):348. [Editor's Notes: Uses HPLC-MS/MS to analyze for morphine, codeine, and other alkaloids. This article is written in German. Contact: Chemisches und Veterinaruntersuchungsamt, Karlsruhe, Germany.]
8. Zweig SE. **From smart tags to brilliant tags: Advances in drug stability monitoring.** BioPharm International 2005;18(11):36. [Editor's Notes: An introduction to the title devices, with discussion of potential uses in tagging sensitive pharmaceuticals and vaccines. Contact: CliniSense Corporation, Los Gatos, CA 15466.]

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## SCIENTIFIC MEETINGS

**1. Title: 16th Annual CLIC Technical Training Seminar** (Second Posting)  
**Sponsoring Organization:** Clandestine Laboratory Investigating Chemists Association  
**Inclusive Dates:** September 6 - 9, 2006  
**Location:** Hong Omni Mont-Royal Hotel (Montreal, Quebec, Canada)  
**Contact Information:** See O.C. Anderson (620 / 792-4353 or carl.anderson -at- kbi.state.ks.us)  
**Website:** None Provided

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## NEW EMAIL ADDRESSES NEEDED

The email addresses for the following organizations returned rejection notices to the *Microgram* Editor for at least the past three issues of *Microgram Bulletin*, and therefore the respective organizations have been dropped from the subscription list. Note that the errors include "mailbox full", "over quota", "user not found", or "user unknown" messages, and also a variety of anti-spam/filtering rejection messages (the latter resulting from failure to "whitelist" the [microgram\\_editor@mailsnare.net](mailto:microgram_editor@mailsnare.net) address). The *Microgram* Editor requests your assistance in contacting these organizations, determining if they wish to remain on the *Microgram* subscription e-net, and if so asking them to forward a valid email address to the [microgram\\_editor@mailsnare.net](mailto:microgram_editor@mailsnare.net) address. In addition, if the Office has closed or is known to be no longer interested, please forward that information to the *Microgram* Editor.

### U.S. Subscribers (by State, except U.S. Government organizations):

Alaska - Wasilla Police Department;

Arizona - DPS Western Regional Laboratory (Lake Havasu City);

Arkansas - Conway Police Department;

California - CHP/Investigative Services Unit (Los Angeles); San Diego Sheriff's Crime Laboratory;  
 Thermo Electron Corporation (San Jose);

Connecticut - Ciencia, Inc. (Hartford);

Kansas - Kiowa County Sheriff;

Maine - Biddeford Police Department;

Michigan - Michigan State Police/Bridgeport Forensic Science Laboratory;

Minnesota - Lower Sioux Tribal Police Department (Morton);

Missouri - Independence Police Department;

New Jersey - Ocean County Prosecutor's Office;

New York - New York State Division of Criminal Justice Services (Albany); Rochester/Office of the Medical Examiner; Suffolk County Crime Laboratory;

North Carolina - Asheboro Police Department; Forsyth County - EAD Crime Laboratory (Winston-Salem);

Texas - Tarrant County Medical Examiners Office;

U.S. Government - DOE/Lawrence-Livermore National Laboratory; USAF - HQSAF/SF; U.S. Army Criminal Investigations Laboratory (Forest Park, Georgia);

Virginia - Virginia Beach Police Department;

Washington, DC - Office of the Chief Medical Examiner;

Wyoming - Wyoming Division of Criminal Investigation (Evanston).

**Non-U.S. Subscribers (by Country):**

Canada - Health Canada/Drug Analysis Service (Longueuil, Quebec); RCMP Forensic Laboratory (Winnipeg, Manitoba);

Denmark - Aarhus Universitet/Institute of Forensic Medicine;

France - Laboratoire de Police Scientifique de Lille;

Germany - BKA/Wiesbaden; Landeskriminalamt Bayer (Muenchen); Landeskriminalamt Berlin;

Hong Kong - Hong Kong Police Force - Narcotics Bureau (Wanchai);

Iceland - University of Iceland/Department of Pharmacology (Reykjavik);

Switzerland - Swiss Customs Administration - DEA/Bern;

United Kingdom - Laboratory of the Government Chemist/Middlesex; Southampton University Hospitals - Critical Care Unit/Hampshire;

West Indies - Trinidad and Tobago Forensic Science Center.

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Mobile phones have become one of the most preferred methods of communication in today's technology hungry world. Not surprisingly, mobile phones have also become quite popular among criminals, and have played an ever increasing role in their illicit activities. Thus, mobile phones can offer unique and potentially invaluable investigative information and leads for law enforcement personnel.

Mobile Phone Forensics is the science of retrieving digital data from a mobile phone using approved methods and under forensically sound conditions. This includes the examination of data found in the phone's internal memory, Subscriber Identity Module (SIM) card, and memory card(s). Recoverable data typically includes contact numbers, incoming calls, sent and missed calls, call times, Short Message Service (SMS) messages, text, images, and videos.

The major challenges for the computer forensic investigator is how to download and extract this information, and then to organize and communicate the findings to the case agent in a rapid and efficient manner. Unfortunately, with wireless communication technologies changing on seemingly a daily basis, it has become increasingly difficult for the law enforcement community to acquire and maintain the tools and expertise needed to properly conduct mobile phone forensics.

### Available Technologies

Today's mobile phone devices come in a huge variety of shapes and sizes. Much more importantly, however, they also have quite a wide variety of capabilities. Even the least sophisticated models can be password protected, and can store hundreds of individuals' contact information - while more advanced models can take and store both digital photos and even digital video.

One of the most popular and most sophisticated mobile phone devices is the Personal Digital Assistant (commonly known as a "PDA"). These have their own operating systems, and can actually be utilized as mini-computers. They not only make calls and store contact information, but also can connect to the internet, thereby giving their users the ability to send/receive email communications, images, photos, and videos. Advanced models have the capability to encrypt their communications, and can also store information on removable media like flash memory cards.

From a forensic viewpoint, there is one major advantage to improved mobile phone technology, that being *non-volatile memory*. Earlier generations of mobile phones were wholly dependent on their internal batteries to maintain stored information; therefore, a critical aspect to seizures was to recharge or replace the batteries as soon as possible, to ensure that the data wasn't lost prior to forensic examination. This is no longer required.

## Available Forensic Software

Unfortunately, available software for mobile phone forensics is quite limited compared to the available software for “standard” computer forensics. As implied above, this is in large part due to the rapid and ongoing changes in mobile phone technologies. These limitations can cause various problems for computer forensic examiners. For example, a specific software program may work well with certain types of mobile phones, but it may only retrieve limited information from other types of mobile phones - and furthermore, this is regardless of whether the software was specifically developed for forensic use, or was instead developed by the manufacturer to retrieve data (in the latter case, the software usually is designed to recover just the contact information). It may be that no software program will work well on a specific phone. For these reasons, it is (still) often necessary to manually retrieve the information (that is, to hand-search the phone using its keypad and menu) - potentially a very tedious and labor-intensive endeavor.

## Available Forensic Hardware

Another major problem in mobile phone forensics is interfacing the phone with the examination computer. Most of the current forensic and commercial software programs cannot retrieve information from mobile phones without appropriate hardware connections. Such hardware includes various adapters, including both wireless (that is, infrared) and brand-specific plug-in systems. Commercially available hardware may contain multiple adapters, for use with all major mobile phone brands. These adapters can both connect the mobile phone device to the examination computer and recharge the battery on most mobile phones.

## Conclusions

At present, there are significant limitations to the type and amount of information that can be retrieved using mobile phone forensics software. There is no comprehensive software program for mobile phone forensics - and due to the rapid technological advances in the field, this situation is likely to continue, at least in the near-term. The various software options that are currently available all have their pros and cons. Therefore, a laboratory has to maintain a vast forensic software library in order to comprehensively retrieve all the information from a mobile phone (that is, regardless of brand or model). This can cause severe budgetary distress. For this reason, it may be impossible for some small computer forensic operations to handle seized mobile phone devices (except by manual searching). In summary, as long as mobile phone technology continues to evolve and diversify, mobile phone forensics will remain a challenge to computer forensic examiners.

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