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JULY 2003

- INTELLIGENCE BRIEF -

VERY LARGE PSILOCYBIN MUSHROOMS, PEYOTE CACTI, AND MARIJUANA GROW OPERATION IN GUILDERLAND AND SCOTIA, NEW YORK

The New York State Police Forensic Investigation Center (Albany, New York) recently received a large polydrug submission consisting of 645 large jars containing growing psilocybin mushroom cultures (see Photo 1), 12 pots with growing peyote cacti, 45 growing marijuana plants, and over 10 pounds of dried psilocybin mushrooms. Growing media, rye grain, hay, mushroom spores, scales, glassware, thermometer, drying racks, firearms, and fireworks were also recovered. The evidence was seized by the Albany County Sheriff's Department from two separate residences in Guilderland and Scotia (suburbs of



Photo 1

Albany), that were set up as large-scale indoor grow operations. The spores were purchased from an Internet source [Details not provided in accordance with *Bulletin* policy]. Analysis of the mushrooms by TLC and GC/MS confirmed psilocybin. Analysis of the peyote cacti by GC/MS confirmed mescaline. The marijuana was not analyzed. None of the exhibits were quantitated.

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- INTELLIGENCE BRIEF -

**METHAMPHETAMINE TABLETS WITH THE FERRARI LOGO
IN LAKE COUNTY, OHIO**

The Lake County Crime Laboratory (Painesville, Ohio) recently received a plastic zip-lock baggie containing 15 red colored tablets with the “Ferrari” logo imprinted on each (See Photo 2). The exhibit was obtained in Mayfield Heights in an undercover purchase by the Mayfield Heights Police Department, and were purported by the seller to be Ecstasy. The tablets measured 8 mm in diameter (width and total net mass not reported). Analysis by GC/MS, however, indicated not MDMA but rather methamphetamine (not quantitated). It appeared that the seller was unaware of the actual composition of the tablets.



Photo 2

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- INTELLIGENCE BRIEF -

**COCAINE BRICKS WITH UNICORN AND HORSHOE LOGOS
IN LOWER CHICHESTER TOWNSHIP, PENNSYLVANIA**

The Pennsylvania State Police Lima Regional Laboratory (Media, Pennsylvania) recently received seven bricks, suspected cocaine, total net mass 7.015 kilograms (approximately 1.0 kilogram/brick). The exhibits were seized from a tractor trailer in Lower Chichester Township (approximately 15 miles south of Philadelphia) during a routine inspection by the Pennsylvania State Police, Media Barracks. Each brick was 9 x 6 x 1.25 inches, white in color, and imprinted with both a unicorn (center) and a horseshoe (upper right corner) logo (see Photo 3). They were multiply packaged in plastic wrap,



Photo 3

clear tape, silver foil, black rubber, yellow duct tape, and finally placed in vacuum sealed bags. Analysis by color testing and GC/MS confirmed cocaine (quantitation not performed). This is the first seizure of bricks with this logo in the Lima Laboratory's jurisdiction.

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- INTELLIGENCE BRIEF -

N,N-DIPROPYLTRYPTAMINE HCL IN ALLIANCE, OHIO

The Canton-Stark County Crime Laboratory (Canton, Ohio) recently received a blue vial, labelled as containing 1 gram of "Ultra-Pure N,N-Dipropyltryptamine HCl (DPT)" (apparently a commercial preparation). The exhibit had been submitted by the Stark County Sheriff's Department, pursuant to a drug overdose in Alliance, Ohio. The victim apparently acquired the material via an Internet sale [Details not provided in accordance with *Bulletin* policy]. The vial still contained 0.49 grams of a white powder, which gave a yellow-fading-to-green Marquis test. Analysis by GC/MS and FTIR, confirmed dipropyltryptamine HCl, based on comparisons with spectral libraries. This was the Crime Laboratory's first encounter with this substance.

[Editor's Note: Spectral data (FTIR, ¹H-NMR, MS, and UV/Vis) for dipropyltryptamine are reported in Mills and Roberson, Instrumental Data for Drug Analysis, Second Edition, Volume 1, pps 770-771.]

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- INTELLIGENCE BRIEF -

MIXED MDMA/PIPERAZINE TABLETS IN SAN DIEGO, CALIFORNIA

The DEA Southwest Laboratory (San Diego, California) recently received two exhibits consisting of 200 and 76 blue/green colored tablets, respectively, with an "HO" or "OH" logo, suspected Ecstasy (see Photo 4). The exhibits were seized in San Diego as part of a larger case (details not reported). Both sets of tablets were poorly pressed, round, flat-edged, biconvex, and weighed about 170 milligrams each. Analysis by FTIR and GC/MS, however, indicated not just MDMA but rather a mixture of MDMA, benzyl-piperazine (BZP), N-(3-trifluoromethylphenyl)piperazine (TFMPP), caffeine, probable methoxyphenylpiperazine (isomer not identified, but probably *ortho* (OMPP or MeOPP)), and 3,4-methylenedioxyphenyl-2-propanone (MDP2P). The 200 tablet sample quantitated to 12 milligrams of MDMA HCl/tablet, while the 76 tablet sample quantitated to 15 milligrams of MDMA HCl/tablet. The piperazine components were not quantitated. All other sample submissions in this case contained only MDMA.



Photo 4

- INTELLIGENCE BRIEF -

MAIL-ORDER PSILOCYBIN MUSHROOM SPORES IN GREAT FALLS, MONTANA

The DEA Western Laboratory (San Francisco, California) recently received a submission of three standard design, plastic, 12 milliliter syringes containing a clear liquid with very small black specks suspended in the solution, suspected to be aqueous suspensions of psilocybin mushroom spores. The exhibits were seized by the Postal Inspector in Great Falls, Montana. Each syringe had a piece of colored tape wrapped around it; one red, one white, and one blue. Each tape had a different alphanumeric code written on it, the meaning of which was not intuitively obvious. For prosecution purposes (attempt to manufacture psilocybin and/or psilocin, controlled substances), it was necessary to show both that the spores were viable (would grow mushrooms), and that the mushrooms grown from the spores contained psilocybin and/or psilocin.

Visual examination of a drop of the liquid at 750x magnification revealed thousands of brownish colored, semi-transparent, oval shaped spores. Each solution was used to inoculate four different growth media: Potato, dextrose, yeast agar (PDY), dog food agar (DFA), malt extract agar (MEA), and brown rice powder and vermiculite. The basic procedures followed those provided in: Gross ST. Detecting psychoactive drugs in the developmental stages of mushrooms. *Journal of Forensic Sciences* 2000;45(3):527. [Further details not provided in accordance with *Bulletin* policy.] Mycelium growth was obtained with two of the syringes; analysis of samples of the mycelium by GC/MS and GC/IRD confirmed psilocin (see: Casale JF. An aqueous-organic extraction method for the isolation and identification of psilocin from hallucinogenic mushrooms. *Journal of Forensic Sciences* 1985;30(1):247). Transfer of the mycelium to a grow chamber resulted in mushroom growth (see Photo 5), and analysis of the dried mushrooms confirmed psilocin. This was the first submission of this type to the Western Laboratory.



Photo 5

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- INTELLIGENCE BRIEF -

SALVIA DIVINORUM IN DAYTON, OHIO

The DEA North Central Laboratory (Chicago, Illinois) recently received a poly-drug submission of marijuana, powdered MDMA, various tablets, and an unknown green plant material, net mass 2.8 grams, similar in appearance to marijuana. The exhibits were seized in Dayton, Ohio by DEA Task Force agents pursuant to a Federal search warrant. After extraction with boiling chloroform for 10 minutes, analysis by GC/MS confirmed salvinorin A, the alleged psychoactive

component of *Salvia Divinorum*. Trace amounts of salvinorin B and salvinorin C were also noted in the GC/MS analysis. This was the laboratory's first encounter with this material.

[Editor's Notes: According to the analyst, a standard workup of the plant material with either methanol (leaves) or chloroform (ground leaves) did not extract salvinorin A; a 10 minute boiling chloroform extraction of the ground leaf material was required. The forensic analysis of *Salvia Divinorum* has been reported; see: Giroud C, Felber G, Augsburg M, Horisberger B, Rivier L, Mangin P. *Salvia divinorum*: A hallucinogenic mint which might become a new recreational drug in Switzerland. *Forensic Science International* 2000;112(2-3):143. Selected Intelligence Briefs concerning *Salvia Divinorum* were reprinted in the January 2002 issue of *Microgram* and the June 2003 issue of *Microgram Bulletin*. Of note, articles concerning *Salvia Divinorum* are appearing with increasing frequency in the mass media, including a *USA Today* feature article dated June 23rd, 2003; this suggests that many forensic laboratories will be encountering this material in the near future.]

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- INTELLIGENCE BRIEF -

UNUSUAL POLY-DRUG LABORATORY IN WASHINGTON, DC

The DEA Mid-Atlantic Laboratory (Largo, Maryland) responded to a clandestine drug laboratory located in the basement apartment of a large apartment complex in Washington, DC, that was the production site for a variety of unusual hallucinogens. The laboratory was discovered when the District of Columbia's Fire and Emergency Medical Services Department responded to a tenant's 911 call for a possible poisoning or overdose of the laboratory operator. Upon arrival, the emergency personnel noted strong and noxious chemical odors, and observed numerous chemicals and glassware, including a red-colored liquid cooking in a 250 milliliter Erlenmeyer flask on a hotplate in the living room (see Photo 6). After removal of the laboratory operator (who nearly died), the laboratory was processed by personnel from the DEA Washington Field Division and the Mid-Atlantic Laboratory.



Photo 6

Analysis of the red liquid indicated a mixture of 3,4,5-trimethoxybenzaldehyde and 3,4,5-trimethoxy-2-methyl-2-nitrostyrene, the intermediate for 3,4,5-trimethoxyamphetamine. Other seizures included 23 grams of 3,4,5-trimethoxy-2-ethyl-2-nitrostyrene (the intermediate for *alpha*-ethylmescaline), 125 grams of *alpha*-methyltryptamine, 200 grams of 3-(2-methyl-2-nitrovinyl)indole (the intermediate for *alpha*-methyltryptamine), 0.10 grams of

ergotamine tartrate (a precursor for LSD), and 10 grams of *Claviceps purpurea* (ergot fungus, a source of ergotamine). None of the exhibits were quantitated. Extensive handwritten notes and computer files were recovered that detailed recipes, experiment modifications, and actual yields and product descriptions, for the manufacture of each of the above substances. Chemical company catalogues were found along with chemical receipts for a wide variety of chemicals. Large amounts of laboratory equipment and supplies were inventoried, including an air-purifying respirator, ultraviolet light source, TLC plates, heating mantles, round bottom flasks, reflux condensers, separatory funnels, Erlenmeyer flasks, side-arm flasks, volumetric flasks, beakers, funnels, graduated cylinders, chromatography columns, thermometers, dropper bottles, filter paper, and a triple beam balance.

The defendant was indicted on the manufacture of *alpha*-methyltryptamine, possession of the listed chemical ergotamine, and attempt to manufacture trimethoxyamphetamine, *alpha*-ethylmescaline, and LSD. Ultimately, the defendant pled guilty to the manufacture of *alpha*-methyltryptamine. As part of his plea agreement, the defendant agreed to a debriefing, during which he indicated he had one year of collegiate level chemistry coursework, and also indicated that he had been “cooking” for over 10 years. He also admitted to attempting to manufacture lysergic acid diallylamide, an LSD analog. Despite the quantities of materials involved, and decade-long operation, the defendant claimed to have produced for personal use only.

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- INTELLIGENCE BRIEF -

“YA-BA”/“THAI TABS” METHAMPHETAMINE TABLETS - AN OVERVIEW

Ya-Ba (“yah-bah”, Thai slang for “mad medicine”) originated in Southeast Asia’s Golden Triangle region – the drug producing area that straddles the borders of Burma, Laos, and Thailand that was the world’s top opium/heroin producing region for many decades. At present, most Ya-Ba tablets are produced in Myanmar (Burma). Over the past five years, Ya-Ba (more commonly referred to as “Thai Tabs” within the United States) has become the most abused drug in Thailand. On May 12, 2003 the Reuters News Service reported that there are currently 2.5 million Thai users (equal to 4 – 5 percent of the population), spending 2 billion U.S. dollars (USD) a year on Ya-Ba tablets. In 2001, an individual Ya-Ba tablet sold for about 50 baht (about \$1.20 USD). However, since the beginning of May 2003, the Thailand government has arrested 58,000 drug traffickers and dealers in a highly aggressive counter-narcotics campaign, driving the price per tablet to about 300 baht (about \$7.00 USD).



Photo 7

As of June 2003, the Source Determination Program (SDP) at the Special Testing and Research Laboratory (Dulles, Virginia) had analyzed over 450 Thai Tab exhibits. The results of these

analyses indicate there are at least 90 different tablet die sets in operation (therefore, there may be as many as 90 different clandestine sources). Thai Tabs encountered in the SDP have been red, orange or green (see Photo 7). The tablets are typically ¼ inch diameter, round, unscored, biconvex tablets which weigh 90-100 milligrams each. These dimensions are smaller, thinner, and lighter than typical Ecstasy tablets (for which they are sometimes mistaken by U.S. users and forensic chemists). Also in contrast to Ecstasy tablets, Thai Tabs have very few monograms. The four most common are: “WY”, “wY”, “Wy” and “wy.” Additional, less common monograms include “M99”, “R”, “888” and “555”. Chemical analyses indicates that the average Thai tablet contains 25 - 30 mg of d-methamphetamine hydrochloride and 50-60 mg of caffeine. However, the SDP has determined that the amount of both d-methamphetamine hydrochloride and caffeine can vary greatly (i.e., from 1 - 47 mg/tablet and 11 - 97 mg/tablet, respectively). Other drugs found in Thai Tabs include: Phenacetin, theophylline, amphetamine sulfate, ephedrine and dimethylamphetamine. A small amount of ethyl vanillin is also typically present, and is included to mask the residual chemical odor from the crude, clandestine manufacturing processes.

Despite their form, Thai Tabs are not intended for oral consumption. Rather, they are smoked for a stronger, faster high, similar to the way heroin is smoked when one “chases the dragon”, or the smoking of “Ice” methamphetamine. The solid dosage form (tablet) allows for easier manipulation with smoking paraphernalia. Due to their superficial similarity with Ecstasy tablets, however, Thai Tabs are occasionally mistaken for and taken as Ecstasy by U.S. users. In addition, an increasing number of “classic” design Ecstasy tablets - *not* Thai Tabs - have been found to include methamphetamine as an added component or as the sole controlled substance. A recent survey of all “classic” Ecstasy tablets that had ever been analyzed by the SDP indicated that 2.5 percent contained a mixture of MDMA and methamphetamine, and 3 percent contained methamphetamine only. Again, however, these latter tablets are *not* Thai Tabs, but rather are so-called MDMA “mimic” tablets containing methamphetamine.

Ya-Ba is commonly seen throughout eastern Asia, southeastern Asia, the East Indies, and Australia. Some recent seizures in those areas totaled hundreds of thousands to millions of tablets. U.S. Customs Service personnel have recently seized Thai Tabs in California, Hawaii, and other western states. In contrast to the seizures in southeastern Asia, however, thus far the typical seizure in the U.S. is 500 - 1000 tablets, usually found concealed in international mail packages sent from one family member in Asia to another in the U.S. However, this problem is expected to increase in the future.

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SOUTH AFRICAN LOGO INDEX POSTED ON THE INTERNET

The South African Police Service, National Forensic Science Laboratory (Pretoria, South Africa) has posted its Drug Logo Index on the Internet, at the following URL:

<http://www.saps.gov.za/profile/component/forensics/drugs/index.htm>

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Selected Intelligence Brief

Information Bulletin: Khat (*Catha Edulis*).

National Drug Intelligence Center
319 Washington St., 5th Floor
Johnstown, PA 15901

[Unclassified; Reprinted With Permission]



The availability of khat, a plant containing stimulants regulated under the Controlled Substances Act, is increasing in the United States. The amount of khat seized by federal law enforcement officers increased dramatically from 14 metric tons in 1995 to 37 metric tons in 2001. Moreover, in the first 6 months of 2002 federal officers seized nearly 30 metric tons of the drug. Individuals of Somali, Ethiopian, and Yemeni descent are the principal transporters and distributors of khat.

Background

Khat (*Catha edulis*)--also known as African salad, bushman's tea, gat, kat, miraa, qat, chat, tohai, and tschat--is a flowering shrub native to northeast Africa and the Arabian Peninsula. The plant usually grows from 2 to 12 feet high; however, it can reach 20 feet. Khat plants typically are grown among crops such as coffee, legumes, peaches, or papayas. Fresh khat leaves contain cathinone--a Schedule I drug under the Controlled Substances Act; however, the leaves typically begin to deteriorate after 48 hours, causing the chemical composition of the plant to break down. Once this occurs, the leaves contain cathine, a Schedule IV drug. Fresh khat leaves are glossy and crimson-brown in color, resembling withered basil. Deteriorating khat leaves are leathery and turn yellow-green in color.

Schedule I and Schedule IV Drugs

Drugs classified as Schedule I under the Controlled Substances Act are those deemed to have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use of the drug under medical supervision. Schedule IV drugs are classified as having a low potential for abuse and a currently accepted medical use in treatment in the United States; abuse of Schedule IV drugs may lead to limited physical or psychological dependence.

Abuse

In the United States khat use is most prevalent among immigrants from Somalia, Ethiopia, and Yemen. These individuals use the drug in casual settings or as part of religious ceremonies. Abuse levels are highest in cities with sizable populations of such immigrants including Boston, Columbus, Dallas, Detroit, Kansas City, Los Angeles, Minneapolis, Nashville, New York, and Washington, D.C. Law enforcement reporting indicates that some other groups in these areas have begun abusing the drug.

Khat typically is ingested by chewing the leaves--as is done with loose tobacco. Dried khat leaves can be brewed in tea or cooked and added to food. After ingesting khat, the user experiences an immediate increase in blood pressure and heart rate. Abusers claim that the drug lifts spirits, sharpens thinking, and increases energy--effects similar to but less intense than those caused by abusing cocaine or methamphetamine. The effects of the drug generally begin to subside between 90 minutes and 3 hours after ingestion; however, they can last up to 24 hours. A state of mild depression can follow periods of prolonged use. Taken in excess, khat causes extreme thirst, a sense of exhilaration, talkativeness, hyperactivity, wakefulness, and loss of appetite. Repeated use can cause manic behavior with grandiose delusions, paranoia, and hallucinations. It also can cause damage to the nervous, respiratory, circulatory, and digestive systems.

Many Muslims, including Somalis, use khat during the religious month of Ramadan. Law enforcement officials in the United States indicate that a large number of khat seizures occur during Ramadan. In 2002 Ramadan occurred from November 5 through December 4. During November and December, U.S. Customs Service (USCS) officials seized nearly 3,000 kilograms of khat from airports in California, Illinois, Kentucky, Minnesota, New York, and Tennessee. [Note: the USCS is now part of the Bureau of Immigration and Customs Enforcement Service under the Department of Homeland Security.]

Availability

Seizure data indicate that the availability of khat is increasing in the United States. According to Federal-wide Drug Seizure System (FDSS) data, federal law enforcement officials seized 14 metric tons in 1995, over 37 metric tons of khat in 2001, and nearly 30 metric tons in the first 6 months of 2002. State and local law enforcement officials also frequently seize kilogram quantities of khat. For example, in October 2002 local law enforcement officials in Merriam, Kansas, seized nine boxes of khat, each weighing over 13 kilograms, and arrested two Somali nationals.

The use of khat is accepted within the Somali, Ethiopian, and Yemeni cultures. In these countries khat is not a controlled substance and is openly sold at markets. Many immigrants from these countries continue to use khat in the United States. As such, khat frequently is advertised openly on signs in ethnic restaurants, bars, grocery stores, and smoke shops. Signs often are printed in the native language of the store owner. Common names for khat that may appear on such signs include kat, qat, chat, gat, tohai, tschat, and mirraa. Khat generally sells for \$300 to \$400 per kilogram or \$28 to \$50 per bundle (40 leafed twigs measuring 12 to 15 inches in length).

Transportation

Khat must be transported quickly to its intended market because of its limited shelf life. Thus, the drug often is transported into the United States, typically through Great Britain and Canada, primarily via package delivery services and, to a lesser extent, by couriers aboard commercial aircraft. Khat also is

transported into the United States from Canada by private vehicle. To maintain freshness during transport, khat frequently is wrapped in plastic bags, banana leaves, or newspapers and sprinkled with water.



Khat Rolled in Newspaper for Transport

Khat smugglers use various tactics to avoid law enforcement scrutiny when shipping the drug via package delivery services. For example, khat usually is listed on manifests (cargo invoices) as Abyssinian or African tea, African salad, molokheya (an Egyptian vegetable), perishable lettuce or fresh vegetables, tobacco leaves, and herbs. It also has been listed as auto parts on at least one occasion.

The amount of khat seized from packages arriving from foreign destinations, as well as the frequency with which these seizures occur, illustrates the extent to which package delivery services are used to transport khat into the United States. According to USCS, kilogram quantities of khat were seized daily between January and September 2002 from packages arriving at the package delivery facility located at the Memphis International Airport. USCS officials seized 3,916 kilograms of khat during that period.

The following examples demonstrate that seizures involving package delivery services are common in other parts of the country as well.

Minneapolis-St. Paul, Minnesota: On December 31, 2002, USCS officials seized over 146 kilograms of khat concealed in seven boxes shipped from the United Kingdom and arrested a 29-year-old Minneapolis resident as he accepted receipt of the boxes.

New York, New York: In August 2002 USCS officials seized 22 packages containing more than 59 kilograms of khat that had arrived in New York from London. The packages were addressed to individuals in several U.S. cities. During a subsequent controlled delivery, the Kansas City, Kansas, Police Department Interdiction Unit arrested four male Somali nationals and one male Ethiopian national. The Omaha Commercial Interdiction Unit also conducted a controlled delivery and arrested

two Somali nationals. Other controlled deliveries have been made in Minneapolis; Norfolk, Nebraska; Seattle; and Sioux City, Iowa.

Kansas City, Missouri: In March 2002 USCS officials seized over 68 kilograms of khat concealed in five boxes shipped from London and arrested two Somali nationals who accepted receipt of the boxes in Kansas City.

Kansas City, Kansas: On October 18, 2002, officers with the Merriam Police Department arrested two Somali men from Minneapolis who were attempting to retrieve several packages containing khat that had been shipped from London, England, to various locations throughout the Kansas City area. The packages were addressed to various individuals with Middle Eastern names and delivered to 10 different hotels via package delivery services. The khat was to be distributed in Minneapolis. At the time of their arrest, the men had retrieved seven of the packages; the police collected the other three.

Khat also is transported into the United States by couriers aboard commercial aircraft. Khat smugglers in Great Britain frequently attempt to recruit couriers who are not of African or Middle Eastern origin, believing such individuals are subject to less scrutiny when entering the United States.



Khat Wrapped in Banana Leaves and Smuggled in a Suitcase

The following example illustrates the use of this smuggling method.

Detroit, Michigan: On January 13, 2003, USCS officials seized approximately 80 kilograms of khat concealed in the luggage of two British women arriving from London. Law enforcement officials executed a controlled delivery of the khat to a hotel near the airport and arrested two Somali men from Nashville, Tennessee, who attempted to receive the drug. The two Somali men were to transport the khat by private vehicle back to Tennessee for distribution among the Somali community in Nashville.

Outlook

Khat likely will become increasingly available in the United States. Abuse of the drug will remain most prevalent in communities with large Somali, Ethiopian, and Yemeni populations. Recent law enforcement reporting indicates that some Caucasian individuals have begun abusing khat; however, the drug likely will not become widely popular due to its limited shelf life and because stimulant abusers commonly seek more intense physiological effects, such as those produced by cocaine and methamphetamine. Although the drug's popularity likely will remain limited to Somali, Ethiopian, and Yemeni populations, khat will remain a growing concern among law enforcement agencies in the United States because of its increasing availability.

Sources

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- * U.S. Department of Homeland Security
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- * U.S. Department of Justice
Drug Enforcement Administration
Federal Bureau of Investigation
Federal-wide Drug Seizure System

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SELECTED REFERENCES

[Note: Selected references are a compilation of recent publications of presumed interest to forensic chemists. Unless otherwise stated, all listed citations are published in English. If available, the email address for the primary author is provided as the contact information. Listed mailing address information (which is sometimes cryptic or incomplete) exactly duplicates that provided by the abstracting services.]

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- Science International 2003;132(2):139. [Editor's Notes: Presents a methodology for comparing heroin profiles. The authors claim that the methodology is solid, reliable, and simple. Contact: BCH, Institut de Police Scientifique et de Criminologie, University of Lausanne, VD, Lausanne-Dorigny 1015, Switzerland.]
3. Gimeno P, Besacier F, Chaudron-Thozet H. **Optimization of extraction parameters for the chemical profiling of 3,4-methylenedioxymethamphetamine (MDMA) tablets.** Forensic Science International 2003;132(3):182. [Editor's Notes: Presents an optimized extraction procedure for recovery of impurities from MDMA tablets using diethyl ether extraction from a pH 11.5 buffered solution, followed by GC/MS analysis. Contact: Laboratoire de Police Scientifique de Lyon, 31 Avenue Franklin Roosevelt, Ecully 69134, France.]
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 5. Hibbert DB. **Scientist vs the law.** Accreditation and Quality Assurance 2003;8(5):179. [Editor's Notes: Presents an analysis of an Australian court case where convicted clandestine laboratory operators were acquitted on appeal due to alleged shortcomings in the laboratory's standard operating procedures. Contact: School of Chemical Sciences, University of New South Wales, Sydney, NSW 2052, Australia.]
 6. Liu J-T, Liu RH. **Enantiomeric composition of abused amine drugs: Chromatographic methods of analysis and data interpretation.** Journal of Biochemical and Biophysical Methods 2002;54(1-3):115. [Editor's Notes: A review describing various chromatographic methods for the enantiomeric analyses of various amine drugs, concentrating on amphetamine and methamphetamine. Contact: Department of Forensic Education, Army Force of Military Police School, Taipei, Taiwan, China.]
 7. Brettell TA, Rudin N, Saferstein R. **Forensic science.** Analytical Chemistry 2003;75(12):2877. [Editor's Notes: Presents a mini-review of forensic science (covering the past two years), and includes numerous drug analysis references, both forensic /law enforcement focused and toxicology focused. This is the latest in a long series of mini-reviews published biannually by the authors in the *Analytical Chemistry* biannual "reviews" issue. Contact: Forensic Science Laboratory Bureau, New Jersey State Police, West Trenton, NJ 08628-0068.]
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 9. Blackledge RD, Taylor CM. **Psychotria viridis – A botanical source of dimethyltryptamine (DMT).** Microgram Journal 2003;1(1-2):18. [Editor's Notes: Presents a forensic and botanical profile for the title substance. Contact: rblackle@ncis.navy.mil]
 10. Azoury M, Zelkowicz A, Goren Z, Almog J. **Evaluation of ninhydrin analogues and other electron-deficient compounds as spray reagents for drugs on thin layer chromatograms.**

- Microgram Journal 2003;1(1-2):23. [Editor's Notes: Evaluates approximately two dozen spray reagents on 14 drugs of forensic interest, and identifies several with enhanced efficacy vs ninhydrin. Contact: miriama@vms.huji.ac.il]
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 16. Hu Y, Zhang J, Liu C-h, Deng C. **Difference of Dragon's Blood from different extract processing.** Zhongcaoyao 2002;33(8):697. [Editor's Notes: Presents analysis via TLC, UV, and HPLC. This article is written in Chinese. Contact: Department of Pharmacy, Medical College of Chinese People's Armed Police Forces, Tianjin 300162, Peop. Rep. China.]

Additional References of Possible Interest:

1. Giroud C, Augsburger M, Menetrey A, Mangin P. **Determination of Zaleplon and Zolpidem by liquid chromatography - turbo - ionspray mass spectrometry; Application to forensic cases.** Journal of Chromatography, B: Analytical Technologies in the Biomedical and Life Sciences 2003;789(1):131. [Editor's Notes: The title technique was applied for analyses of whole blood. Contact: Laboratoire de Toxicologie et de Chimie Forensiques, Institut Universitaire de Medecine Legale, Rue du Bugnon 21, Lausanne CH-1005, Switzerland.]
2. McKay GJ. **Forensic characteristics of organic peroxide explosives (TATP, DADP, and HMTD).** Kayaku Gakkaishi 2002;63(6):323. [Editor's Notes: Comprehensive analysis for triacetone triperoxide, diacetone diperoxide, and hexamethylene triperoxide diamine are reported. These homemade explosives have been implicated in clandestine laboratory booby traps. The article is written in English. Contact: Forensic Explosives Laboratory, Dstl Fort Halstead, Sevenoaks, Kent TN14 7BP, United Kingdom.]
3. Carter JF, Sleeman R, Parry J. **The distribution of controlled drugs on banknotes via counting machines.** Forensic Science International 2003;132(2):106. [Editor's Notes:

Handling of currency-mimicking blanks by counting machines or by hand resulted in transfer of minute quantities of cocaine to the blanks. Contact: School of Chemistry, Organic and Biological Section, University of Bristol, Cantock's Close, Bristol BS8 1TS (country not listed, but assumed to be the United Kingdom).]

4. Shen H, Carter JF, Brereton RG, Eckers C. **Discrimination between tablet production methods using pyrolysis-gas chromatography-mass spectrometry and pattern recognition.** *Analyst* 2003;128:287. [Editor's Notes: The presented technique can differentiate between tablets produced by wet granulation versus direct compression. Contact: School of Chemistry, University of Bristol, Cantock's Close, Bristol, BS8 1TS, United Kingdom.]
5. Pihlainen K, Sippola E, Kostianen R. **Rapid identification and quantitation of compounds with forensic interest using fast liquid chromatography - ion trap mass spectrometry and library searching.** *Journal of Chromatography A* 2003;994(1-2):93. [Editor's Notes: The title technique uses a monolithic column, gradient elution, and a 5 minute total analysis time, with detection limits ranging from 10 to 50 ng/mL for 14 forensically relevant drugs (opiates, benzodiazepines, LSD, and barbiturates). The method was applicable to urinalysis. Contact: Kostianen R, Natl Bur Invest, Crime Lab, POB 285, FIN-01301 Vantaa, Finland.]
6. Matsumura S, Takezawa H, Isa K. **The fragmentation of amine cluster ions including HCl - Proton affinities of drugs of abuse.** *Journal of the Mass Spectrometry Society of Japan* 2003;51(1):196. [Editor's Notes: The results are used to determine the proton affinities of methamphetamine and analogs (unspecified in abstract). Contact: Forensic Science Laboratory, Fukui Prefectural Police Headquarters 3-17-1 Ohte, Fukui 910-8515, Japan.]
7. Adar F, IeBourdon G, Reffner J, Whitley A. **FT-IR and Raman microscopy on a united platform - A technology whose time has come.** *Spectroscopy* 2003;18(2):34. [Editor's Notes: The referenced combined instrument is introduced and discussed. [Note: This *may* be an "infomercial"; not clear from abstract]. Contact: Jobin Yvon, Inc., Edison, NJ (no zip code was provided.)

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THE DEA FY - 2003 STATE AND LOCAL FORENSIC CHEMISTS SEMINAR SCHEDULE

The remainder of the FY - 2003 schedule for the DEA's State and Local Forensic Chemists Seminar is as follows:

September 15 – 19, 2003

Note that the school is open only to forensic chemists working for law enforcement agencies, and is intended for chemists who have completed their agency's internal training program and have also been working on the bench for at least one year. There is no tuition charge for this course. The course is held in Northern Virginia, near the Washington/Dulles International Airport. For additional information, eligibility requirements, or to enroll, see the September 2002 issue of *Microgram Bulletin*, or call 703 668-3337.

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EMPLOYMENT OPPORTUNITIES

1. DuPage County Sheriff's Office Crime Laboratory

(Second Posting)

Position: Forensic Chemist (FS-II)

Location: Wheaton, Illinois (34 Miles West of Chicago)

Salary Range: \$37,670 - \$71,270 per year (Starting Salary is Negotiable and Commensurate with Experience.)

Application Deadline: Open Until Filled

Duties: Responsibilities will include the examination and evaluation of scientific evidence; interpretation of laboratory analyses and results; preparation of written reports, and the ability to testify as an expert witness. Ancillary responsibilities include maintenance of laboratory equipment and supplies; management of caseloads, and attendance at workshops and seminars as required.

General Requirements: The applicant must be skilled in using gas chromatography, mass spectroscopy, ultraviolet and infrared spectrophotometry and other drug screening equipment, and must be able to work independently. Minimum requirements of the position include, but are not limited to: Bachelor's degree in a natural science; two years of practical working experience in a forensic laboratory including court testimony as an expert witness; and above average knowledge of and ability to apply scientific methods and disciplines of laboratory testing and analysis.

Application Procedures: For further information please contact:

John Collins, Laboratory Director
501 N. County Farm Road
Wheaton, IL 60187
Telephone: (630) 682-7198
Fax: (630) 682-7908
E-mail: jcollins@dupageco.org

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2. State of Connecticut, Department of Public Safety, Scientific Services Division

(Second Posting)

Position: Director of Toxicology, Controlled Substances / Toxicology Section

Location: Hartford, Connecticut

Salary Range: Negotiable

Application Deadline: Open Until Filled

Overview: The State of Connecticut is offering you that opportunity to create your own vision as Director of the Controlled Substances and Toxicology Laboratory, in the Scientific Services Division, Department of Public Safety, which has one of the most professional and prestigious reputations in the United States. As the Chief Toxicologist, you can focus your energies on directing staff and operations of the laboratory, as administrative responsibilities are shared. Your working environment will be with a highly dedicated and professional staff supported by cutting edge tools and technology.

Duties: We are seeking an individual with proven leadership abilities, a passion for research and development, and the ability to complete the laboratory accreditation process. Responsibilities include: Directing staff and scientific operations of a forensic toxicology laboratory; coordinates, plans and manages laboratory programs; formulates program goals and develops laboratory policy; develops and implements techniques necessary to examine chemical and biological evidence; researches new methodology; reviews laboratory findings and supervises report preparation; interprets and administers pertinent laws; trains, supervises and evaluates staff; responds to queries regarding drug effects and chemical actions; serves as expert witness on relevant issues in court cases; and performs related duties as required.

Qualifications: A minimum of 10 years experience and training in toxicology and criminalistics in a public health or general toxicology laboratory. Two years of this experience must have been in a supervisory capacity in a major program in forensic toxicology. You must have a comprehensive understanding of the principles and techniques of analytical chemistry (to include infrared and ultra violet spectrophotometry, gas and high performance liquid chromatography, mass spectrometry, and immunoassays). Also, a comprehensive knowledge of the principles of pharmacokinetics and pharmacodynamics is required. Passing an extensive background check is a hiring requirement. The ideal candidate will have a Ph.D. in Toxicology, pharmacology, or related biological or chemical science and will be Board Certified or eligible for Board Certification in Forensic Toxicology.

In addition to a competitive salary, the State of Connecticut total compensation plan includes a generous benefit package worth over 36% of an employees' annual salary. Benefits and options include: A choice of medical and dental plans designed to suit your need, long and short term disability, life insurance, an excellent retirement plan, deferred compensation plan, 12 paid holidays, personal leave days, sick time, and a generous vacation plan. For more information go to: www.das.state.ct.us.

Application Procedures: Please forward your resume, cover letter and salary requirements to:

Patsy McLaughlin
Manager of Recruitment
State of Connecticut
Department of Administrative Services
165 Capitol Avenue, R. G-1
Hartford, CT 06106

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3. Indian River Crime Laboratory

(First Posting)

Position: Forensic Chemist
Location: Fort Pierce, Florida
Salary: \$45,000 – \$60,000, Depending on Experience
Application Deadline: Open Until Filled

Duties: Responsibilities include the analysis of controlled substances; interpretation of laboratory analyses and results; preparation of written reports; and the ability to testify as an expert witness.

General Requirements: The applicant must be skilled in using gas chromatography, mass spectroscopy, ultraviolet and infrared spectrophotometry and other drug analysis equipment and methodologies. A familiarity with the technical and safety requirements of ASCLD-LAB, and demonstrated proficiency testing in controlled substance analysis are required. A Master's degree in chemistry or forensic science (with chemistry undergraduate degree) and two years of forensic laboratory experience are preferred. Experience in head-space BAC analysis is desirable. An extensive background investigation is required, and laboratory personnel are subject to random drug testing. EEO.

Application Procedure: Applications may be obtained on-line at www.stluciesheriff.com or by contacting:

Saint Lucie County Sheriff's Office
Human Resources Department
4700 W. Midway Road
Fort Pierce, Florida 34981-4825
Phone: (772) 462-3206
Fax: (772) 462-3218

For information about the position, contact:

Daniel C. Nippes
Chief Criminalist
Indian River Crime Laboratory
2502 S. 35th Street
Fort Pierce, Florida 34981
dnippes@ircc.edu
Phone: (772) 462-4765

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SCIENTIFIC MEETINGS

1. **Title:** 29th Annual Meeting of the Northeastern Association of Forensic Scientists (Second Bimonthly Posting)
Sponsoring Organization: Northeastern Association of Forensic Scientists
Inclusive Dates: November 5 - 8, 2003
Location: Crowne Plaza Hotel, Pittsfield, MA
Meeting Registration Procedure, Deadline, and Costs: [Not Provided] (Continued on Next Page)

Recommended Lodging (Registration Deadline and Costs): [Not Provided]
Contact Individual's Name, Phone Number, and email Address: Jennifer F. Limoges, 518/457-0054 (FAX 485-8502),
jlimoges@troopers.state.ny.us
Website: [Not Provided]

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2. **Title:** SWAFS 2003 Training Conference (Second Bimonthly Posting)
Sponsoring Organization: Southwestern Association of Forensic Scientists
Inclusive Dates: November 3 - 6, 2003
Location: Radisson Plaza Hotel, Fort Worth, TX
Meeting Registration Procedure, Deadline, and Costs: [Not Provided]
Recommended Lodging (Registration Deadline and Costs): [see: www.radisson.com/ftworthtx 800/333-3333]
Contact Individual's Name, Phone Number, and email Address: Michelle O'Neal, 817/920-5700, x163,
fortworth2003@swafs.org
Website: [www.swafs.org]

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3. **Title:** Clandestine Laboratory Investigating Chemists Association, 13th Annual Technical Training Seminar (Second Posting)
Sponsoring Organization: Clandestine Laboratory Investigating Chemists Association
Inclusive Dates: September 3 - 6, 2003
Location: Richmond, VA (Omni Richmond Hotel)
Meeting Registration Procedure, Deadline, and Costs: [Contact Organizers for Flyer]
Recommended Lodging (Registration Deadline and Costs): [Contact Organizers for Flyer]
Contact Individual's Name, Phone Number, and email Address: Two Contacts listed: 1) Roger Ely, 415/744-7051,
rogely@atdial.net; 2) Rick Fortune, 804/786-9637, rfortune@dfs.state.va.us
Website: [None]

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THE JOURNAL/TEXTBOOK COLLECTION EXCHANGE

FREE TO ANY SUBSCRIBER

Unless otherwise noted, requests for any of the following offerings should be emailed to the *Microgram* Editor at: microgram_editor@mailsnare.net Requests should include complete mailing address information, **and should confirm that the provided destination is a "safe" (irradiation free) address.** Unless otherwise noted, in cases of competing requests, libraries have precedence. [Note: Postage for offerings from the DEA Office of Forensic Sciences will be covered by the Office.]

- 1) *Analyst* 2002;127(11) (November 2002); 2002;127(12) (December 2002); 2003;128(1) (January 2003). Note: Should be requested only by a subscriber who needs to fill holes in an existing collection.
- 2) *Analytical Chemistry* Approximately 20 years worth of *Analytical Chemistry*, roughly 1970 - 1990. Some issues missing. Contact Melvin Ritter at: ritter.melvin@epamail.epa.gov
- 3) *Environmental Chemistry* Approximately 10 years of *Environmental Chemistry*, roughly early 1980's through early 1990's. Not complete. Contact Melvin Ritter at: ritter.melvin@epamail.epa.gov
- 4) *Journal of Chromatographic Sciences* 1989;27(1) through 1997;35(1); mostly bound.

- 5) *Journal of Forensic Sciences* 2000;45(6) (November 2000). Note: Should be requested only by a subscriber who needs to fill a hole in an existing collection.
- 6) *Clinical Chemistry* 2002;48(Numbers 1 - 12). One full year, complete.
- 7) *Microgram - Last Call!!!* In mid-2002, the Office of Forensic Sciences completed a comprehensive reorganization and inventory of its entire *Microgram* archive 1967 – 2002. As a result, several thousand excess monthly issues, dating back to 1971, were identified. These issues were first offered in the September 2002 issue of *Microgram Bulletin*, with the specification that they were intended to fill "holes" in existing collections (not to create new, partial collections), and over 500 issues were requested in that spirit. The remaining issues are now available to any current *Microgram* subscribing office **that has a law enforcement affiliation** (all issues 1967 to 2002 were and remain law enforcement restricted). The Office also has several dozen "bound" (2 year) issues, from 1984 - present, and these are also available any current *Microgram* subscribing office **that has a law enforcement affiliation**.

All issues are now available on a first come/first serve basis, including to those who wish to create a "best possible" partial collection. Note that there are many gaps in the available archive (including many entire years), and only a very few available copies for other issues. It is therefore quite unlikely that any request can be completely satisfied. Also note that the condition of the available issues vary from "mint" to only "fair".

Note that the remaining collection will be destroyed within the next three months, so interested subscribers should respond as soon as possible.

The next offering of journals and textbooks will be in the October 2003 issue of *Microgram Bulletin*. Subscribers who are interested in donating items or collections should consult the *Microgram* website for instructions.

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Digital evidence report writing is usually a straightforward recitation of findings of fact, with occasional expert opinions rendered regarding computer ownership, access, timelines of events, and user-computer or user-network interactions. A critical aspect for most digital evidence examinations is the processing of the original evidence to produce a report that accurately and precisely describes the information and data. This can be challenging, because the descriptive terminology in the digital evidence field can include quite similar terms that have significantly different technical and legal meanings. For example, some of the technical terms in current use to describe some form of a copy include: duplicate, bit stream copy, image, physical copy, logical copy, and work or working copy. Caution is required when using such closely related terminology, because there are specific technical, legal, and informational implications associated with each term. The differences between terms are important when drafting up examination notes and (especially) when writing the final report.

Technical

In a technical sense, each term in the digital evidence field has a specialized meaning. Most

often, that meaning has evolved over the years, largely as a result of usage by specific computer forensic software manufacturers. For example, the term “duplicate” has come to be associated with the concept of an “exact copy” that is identical to the original. That may seem intuitively obvious, but there are subtleties.

Duplicates

Duplicates are a one-to-one mapping (copying) of hard drive storage areas known as sectors. Analogous terms include mirror image, physical copy, or a sector-by-sector copy. Duplication involves the copying of all “addressable” sectors except for bad sectors located on the original hard drive. Duplicate hard drives are usually bootable unless there is some specialized “security handshake” between the original hard drive and the original computer’s motherboard. [Some laptop manufacturers, such as certain models of IBM, have incorporated the “handshake” technique as an extra information security measure.] Duplicates are created by using specialized forensic software or hard drive-to-hard drive duplicator hardware (Solomasster or Logicube). Until recently, the creation of duplicates has been the preferred method of digital evidence acquisition.

Images

Another technical term commonly used in the copying field is “image”. An image is a file that contains all of the data and attributes of the original evidence hard drive. The image file can be mounted (processed) by computer forensic examination software to produce a virtual drive that can be keyword searched or viewed. The image file is usually stored in either 2-gigabyte or 640 megabyte blocks of data. Images may contain imbedded checksum values for data authentication purposes. However, images are not “exact copies” in the sense that they are not directly bootable, and programs contained within the image cannot execute; but as noted above, they can be easily accessed by computer forensic software as a virtual drive. And technical issues such as hard drive geometry or hard drive file structure type are greatly simplified, thereby making access to the user’s data quick and straightforward. Images can be used to create a bootable drive if needed. Common digital evidence forensic imaging software containing imbedded checksums include Guidance Software’s Encase, Safeback from New Technologies Incorporated, and Symantec’s Ghost. [Imaging software that does not contain imbedded checksums include: Unix dd

command, the Department of Defense Computer Forensic Lab's DCFL-DD, or ASR's SMART software.] Images have become the preferred method of acquisition in many types of digital evidence examinations, because it is easy to process regardless of file structure.

Logical Copy

A third technical term in use is "logical copy". A logical copy involves the copying of a specific part of a hard drive. The logical copy may consist of a small unit of a hard drive or floppy data storage such as a cluster or file. Or it might include larger storage areas such as a file directory or even a complete partition. Logical copies are accurate representations of the original, but are (obviously) not complete copies of the original media.

Why Then Use Them?

Logical copies are useful when the Case Agent is faced with very large (i.e., terabytes or pentabytes) data storage technologies. In such cases, it may be nearly impossible to copy all of the data.

[Fortunately, however, it is usually not necessary to copy everything.] Logical copies are sometimes the only practical method of evidence collection for network examinations, especially when an entire network cannot be shut down for duplication or imaging.

The Legal Perspective

At present, the legal domain recognizes two terms – "original" and "duplicate". Federal Rule of Evidence 1001 defines original as follows: "An

original of a writing or recording is the writing or recording itself or any counterpart intended to have the same effect by a person executing or issuing it. An original of a photograph includes the negative or any print therefrom. If data are stored in a computer or similar device, any printout or other output readable by sight, shown to reflect the data accurately, is an original".

A duplicate is defined as follows: "...a counterpart produced by the same impression as the original, or from the same matrix, or by means of photography, including enlargements or miniatures, or by mechanical or electronic re-recording, or by chemical reproduction, or by other equivalent techniques which accurately reproduces the original".

Best Evidence Rule 1003 states that: "a duplicate is admissible to the same extent as the original unless: (1) A genuine question is raised as to the authenticity of the original; or (2) In the circumstances it would be unfair to admit the duplicate in lieu of the original." It is clear that the Federal legal system confers special meaning to the word "duplicate".

The Issue Restated

The formal definitions above illustrate why digital evidence examiner personnel must exercise caution in the use of technical terms. On the one hand, law enforcement, jurists, and juries may not understand terms such as bit stream, image, or logical copy. On the other, the term "duplicate" has specific

technical and legal meaning. The imprecise or inaccurate use of technical copying terms by examiner personnel could be a source of embarrassment upon aggressive cross-examination.

DEA Practice

DEA has bridged the technical-legal gap by streamlining its report writing to use only the word "copy". The technical details of the copying process are recorded in the examination notes and are available should that particular examination procedure be questioned. This approach simplifies the final report of examination for all audiences, and utilizes an all-encompassing inclusive term that will always be correct regardless of technique used.

Recommendations

Digital evidence examiners and program managers need to carefully review their standard operating procedures to ensure that their reports accurately reflect what they actually do. Organizations publishing recommended best practices or guidelines need to incorporate as much flexibility into their descriptive terms as possible. When in doubt, keep it simple.

Questions or comments?
E-mail: mphelan@erols.com