DrugNetAsia

Year 2006 Issue 5

A Regional Newsletter for Participating Laboratories at the UNDCP Consultative Meeting of Heads of Drug Testing Laboratories in Southeast Asia

Editor's notes

The commencement of UNODC Project H44 on "Scientific support to strengthen regulatory and law enforcement control of amphetamine-type stimulants and their precursors in East, South and South-East Asia" has propelled the sharing of scientific information *via DrugNetAsia* to a greater height. The Project Inception Meeting in May as well as the First Regional Workshop in September have reaffirmed the utmost importance of information sharing among the regional forensic laboratories in order to tackle the rising of new drugs. This newsletter has hence been given this important task of facilitating the sharing of data so that new emerging drug trends can be promptly identified and the quality of laboratory analysis enhanced. In order to achieve this target, we will double the frequency of this publication for the duration of Project H44. However, the success of this publication is dependent on your contributions of articles! We would like to thank all our contributors for the many interesting and informative articles for this issue. Happy reading!

UNODC Project H44 Inception Meeting, 25-26 May 2006, Bangkok

UNODC Project H44 First Regional Workshop, 4-13 September 2006, Bangkok

Articles in this issue

"Erimin 5" Tablets in Singapore

Introduction

"Erimin 5" tablets is a common drug of abuse in Singapore. Most of these tablets seized were found to be illicit in nature. The commercial tablets contain nimetazepam as the active ingredient and are used as a therapeutic agent for insomnia. The tablets bear the manufacturer's logo as well as the markings of "028" and "5" and are of a uniform peach colour.

Fig. 1: Differences in physical and chemical characteristics of commerical and some common illicit "Erimin 5" tablets

The illicit "Erimin 5" tablets seized in Singapore closely resembled the commercial tablets in terms of colour and size but slight variation in the manufacturer's logo as well as the font size of "028" and "5" could be observed in some of the tablets (Fig. 1). The chemical composition of these illicit tablets often differed from that of the commercial version. In these tablets, nitrazepam was often detected along with nimetazepam. In some seizures, nitrazepam was detected alone. Other adulterants such as caffeine, menthol, melatonin and carbamazepine were also encountered (Fig. 2).

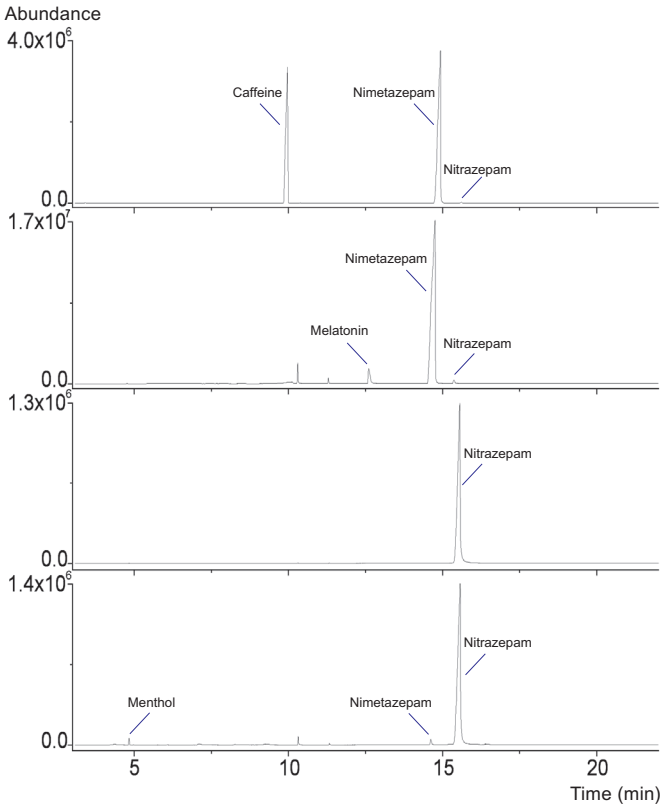

Fig. 2: Total ion chromatograms of illicit "Erimin 5" tablets

Unusual Seizures of "Erimin 5" Tablets

Recently, "Erimin 5" tablets in green and pink colour were also encountered by the laboratory (Fig. 3).

Fig. 3: Green and pink "Erimin 5" tablets

In November 2005, the laboratory received the first seizure of green "Erimin 5" tablets. The size of the tablets, the manufacturer's logo and the font size of "028" and "5" resembled that of the commercial tablets. However, the tablets were green and double stamping of "5" could be observed. GC/MS analysis of the tablets revealed the presence of menthol, nimetazepam and nitrazepam (Fig. 4). The laboratory had received about ten such seizures to date.

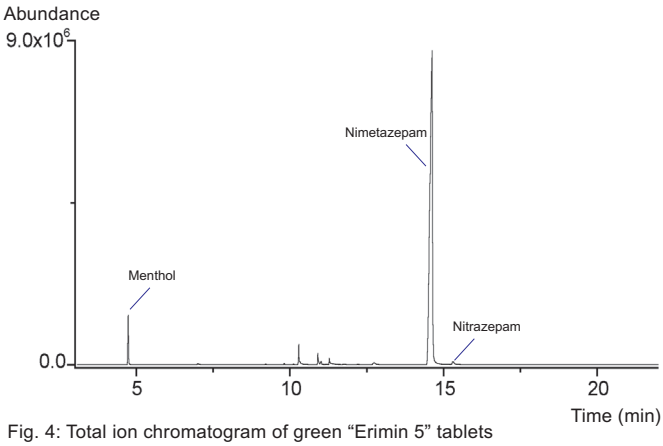

Fig. 4: Total ion chromatogram of green "Erimin 5" tablets

Pink "Erimin 5" tablets made its first appearance in Singapore in June 2006. Two seizures were encountered in the same month and all the tablets in these seizures were poorly made. The size of the tablets was inconsistent and the manufacturer's logo and the marking of "028" and "5" were not well made. GC/MS analysis of the tablets showed the presence of menthol, methamphetamine, ephedrine (the isomer was determined by derivatisation with TFAA), paracetamol, caffeine, carbamazepine and nitrazepam (Fig. 5). The amount of methamphetamine in these tablets was found to be about 4 mg per tablet using HPLC analysis.

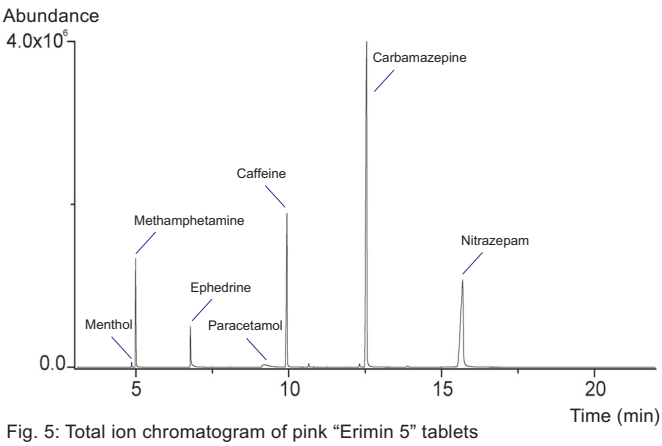

Fig. 5: Total ion chromatogram of pink "Erimin 5" tablets

~Contributed by the Centre for Forensic Science, HSA, SINGAPORE~

Clandestine Methamphetamine Laboratory in Malaysia

In 2004, a large clandestine methamphetamine laboratory with international criminal links was uncovered in a factory in Semenyih, which is located about 40 km from Kuala Lumpur. The laboratory employed the two-step Emde process - chlorination of pseudoephedrine/ephedrine with thionyl chloride, followed by catalytic hydrogenation on a palladium-based catalyst. Large quantities of purified and crude methamphetamine hydrochloride were seized from the laboratory. Among the chemicals seized were acetone, barium sulphate, hydrochloric acid, sulphuric acid, methanol, sodium acetate, activated charcoal, ninety one 100 g bottles of palladium chloride, seventy eight 25 kg containers of thionyl chloride and about 2000 kg of the intermediate product, a mixture of chloropseudoephedrine and chloroephedrine.

Analysed Samples	Techniques Used
Crystalline Methamphetamine HCl	GC, GC/MS, FTIR, Melting point, Polarimetry
Methamphetamine HCl Solutions, Methamphetamine Base	HPLC, ICP/MS (Ba and Pd)
Chloropseudoephedrine/ Chloroepherine	HPLC, FTIR, Melting Point
Solid Chemicals eg. NaCl, $PdCl_2$, $BaCl_2$, $BaSO_4$, $NaCH_3COO$, CaO, $Ca(OH)_2$	SEM, XRD

Table 1: Summary of analytical techniques employed

No ephedrine or pseudoephedrine was recovered from the clandestine laboratory. All methamphetamine hydrochloride samples were found to be the (+)-enantiomer indicating that either (-)-ephedrine or (+)-pseudoephedrine was used. HPLC and FTIR analysis of the 2000 kg of the intermediate product seized and those found on the floor as well as paraphernalia showed that (+)-pseudoephedrine was the precursor. It has been reported that chlorination of (-)-ephedrine yields chloropseudoephedrine and chloroephedrine in the ratio 9:1 while the ratio is 6:4 for (+)-pseudoephedrine[1,2]. This ratio is 6:4 for the intermediate product seized from the clandestine laboratory, thus indicating that (+)-pseudoephedrine was used. Control experiments using (-)-ephedrine and (+)-pseudoephedrine reference standards chlorinated with thionyl chloride were performed and the results obtained were concordant with literature findings.

Fig. 1: The clandestine laboratory in Semenyih

Fig. 2: The two hydrogenators

Fig. 3: Crude methamphetamine HCl "iced-out" in cold room

Fig. 4: Methamphetamine HCl solutions

Fig. 5: 78 x 25 kg of thionyl chloride

Fig. 6: Centrifuge to spin dry the intermediate product

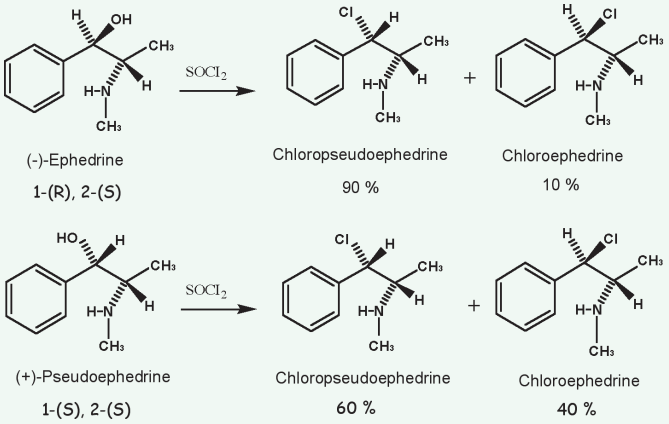

Fig. 7: Products from chlorination of (-)-ephedrine and (+)-pseudoephedrine

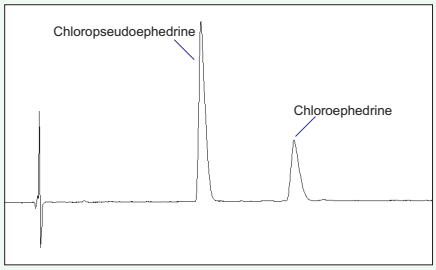

Fig. 8: HPLC profile of the intermediate product obtained from the clandestine laboratory

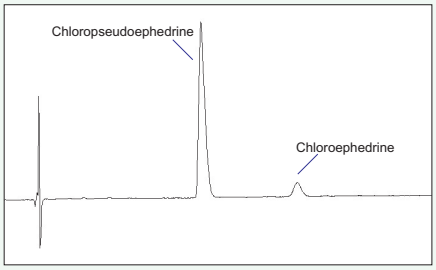

Fig. 9: HPLC profile of the chlorination product of (-)-ephedrine reference standard

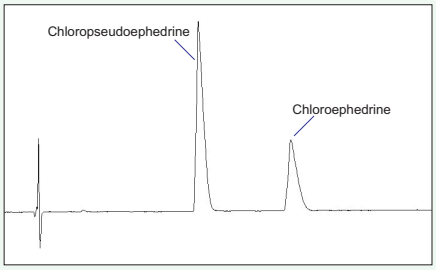

Fig. 10: HPLC profile of the chlorination product of (+)-pseudoephedrine reference standard

References:
1. Noggle, *et al*, "Liquid Chromatographic Determination of the Enantiomeric Composition of Methamphetamine Prepared from Ephedrine and Pseudoephedrine", *Anal. Chem*., 58 (1986),1643-1648.
2. Flores-Para, *et al*, "Chlorination Reactions of Ephedrines Revisited", *Tetrahedron: Asymmetry,* 9 (1998), 1661-1671.

~Contributed by the Department of Chemistry, MALAYSIA~

Buprenorphine Abuse in Singapore

Buprenorphine is a semi-synthetic opiate derived from thebaine, an alkaloid that occurs naturally in opium. Buprenorphine was approved for use in 2000 and introduced in 2002 for the treatment of opiate dependence. The drug is available as sublingual tablets under the Tradename Subutex® (Fig. 1), but abusers are crushing and dissolving the tablets, sometimes mixing with a benzodiazepine, and injecting the liquid intravenously to achieve a "high".

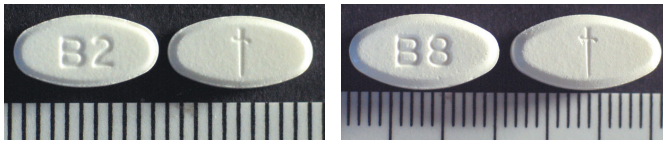

Fig. 1: Subutex® 2 mg tablets (left) and Subutex® 8 mg tablets (right)

Since May 2003, the laboratory started to receive exhibits containing buprenorphine. The majority of the exhibits submitted (about 75-80%) were mostly whole tablets or fragments of tablets. The rest of the exhibits comprised buprenorphine powder, mixture of powders with benzodiazepines such as midazolam, and paraphernalia such as spoons or bottle caps. From 2004, syringes containing buprenorphine powder or liquid, as well as concoctions of buprenorphine and benzodiazepines, became increasingly common. Figs. 2 and 3 show the chromatogram of a Subutex® tablet and the mass spectrum of buprenorphine, respectively.

To curb the abuse of buprenorphine, it was listed as a Class A Controlled Drug under the Misuse of Drugs Act from 14 August 2006. Those arrested and convicted for the trafficking of buprenorphine will face both imprisonment and caning. First- and second-time abusers arrested for buprenorphine consumption will undergo compulsory treatment and rehabilitation at the Drug Rehabilitation Centres. With effect from 1 October 2006, third-time or more abusers will face a stiffer penalty which includes both imprisonment and caning.

~Contributed by the Centre for Forensic Science, HSA, SINGAPORE~

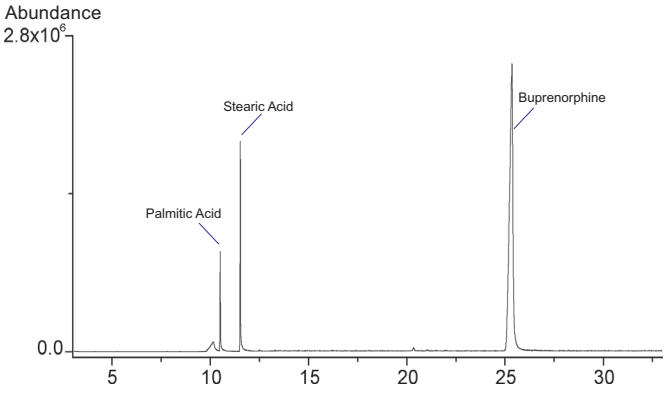

Fig. 2: Total ion chromatogram of a Subutex® tablet

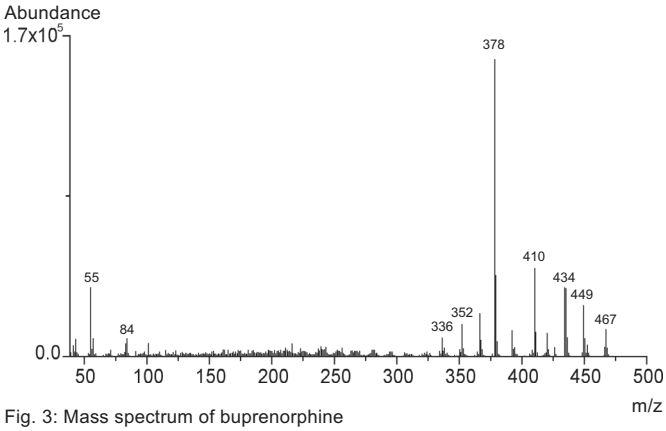

Fig. 3: Mass spectrum of buprenorphine

Heroin Purity Check Device ?

In 2004, the central laboratory at Petaling Jaya encountered a case involving several compressed heroin hydrochloride blocks. The blocks were stamped "S5" and each weighed about 170 g and measured 15x11x4 cm (Fig. 1). Submitted with the heroin blocks was a device purported to be used by the buyer to check the purity of the heroin. The contraption comprised a cylindrical temperature measuring unit (Fig. 2) and a portable gas stove (Fig. 3). According to the law enforcement officer who made the arrest, the purity of heroin was estimated from the melting point of a powdered sample placed on top of the metal cylindrical block which was heated on the gas stove.

Fig. 1: Compressed "S5" heroin block

Fig. 2: Temperature measuring device

Fig. 3: The device placed on a gas stove

~Contributed by the Department of Chemistry, MALAYSIA~

'Ice' in Lao PDR

The laboratory carries out analysis on drug samples which are submitted by the law enforcement officers. In the past three years (2003-2005), most of the samples submitted were found to be methamphetamine, followed by heroin, opium and cannabis. Some of the methamphetamine samples were found to be cut with caffeine. Samples containing no controlled substances were also found.

Recently, a case involving a large amount of methamphetamine in the crystalline form was encountered. These "ice" seizures were believed to be trafficked into Lao PDR from the neighboring countries.

The number of drug samples submitted by the law enforcement officers has increased over the years and this seems to suggest a rising trend of trafficking cases in Lao PDR. In order to control the drug abuse situation, Lao PDR has stepped up measures to prevent the illegal smuggling of precursor chemicals and the diversion of these chemicals to produce other controlled substances.

~Contributed by the Food and Drugs Quality Control Centre, LAO PDR ~

Dimethylamphetamine and Ketamine in Brunei

Dimethylamphetamine

The trend and distribution of drugs of abuse currently controlled under the Misuse of Drugs Act, Brunei Darussalam are closely monitored in the country. While the distribution of drugs of abuse that are not currently controlled has been successfully curbed by the Narcotics Control Bureau (NCB), the legislation process to regulate these drugs is still on-going. As a result of this, abusers and traffickers in possession of these non-controlled drugs of abuse cannot be prosecuted. A good example was seen during the first half of the year 2006 when a drug of abuse, dimethyl-amphetamine (DMA), made an appearance in Brunei Darussalam.

Between January and June 2006, the Brunei Darussalam Government laboratory (Department of Scientific Services) received a number of exhibits from the NCB that looked like a clear-cut case of the commonly abused drug, methamphetamine (MAMP). However, the results of the analysis of the exhibits were unexpected when they turned out to be negative or in some cases, with only trace amounts of MAMP. Further analysis found the exhibits to contain DMA.

The appearance of the crystalline substance found to contain DMA (Fig. 1) closely resembled that of a crystalline MAMP (Fig. 2) and one can be easily deceived by the looks of the exhibit. During this period, the laboratory received about 19 drug seizures and at least 30 urine cases involving DMA abuse.

Fig. 1: Substance containing DMA

Fig. 2: Substance containing MAMP

The laboratory found two types of exhibit containing DMA: the first one is a pure form while the second is a mixture of DMA with a small amount of MAMP. Since our laboratory does not report the detection of DMA, exhibits found to contain only DMA was reported as "to contain no controlled narcotics" while the second type was reported as "to contain trace amounts of MAMP".

Ketamine

The laboratory has also recently detected ketamine, which is currently not controlled in Brunei. This drug was first detected by the laboratory two years ago and there was one case each year. The exhibits received were in small amounts. However for this year, the laboratory had already received two cases by July. One of the cases was the biggest seizure of ketamine, with about 150 green and pink tablets (Fig. 3). Preliminary analysis showed the presence of ketamine. Further analysis will be carried out by the laboratory to complete the case.

Fig. 3: Green and pink tablets containing ketamine

The detection of such non-controlled drugs of abuse frustrated the investigating and prosecuting officers since no legal action could be taken against the defendants. Investigators feared that this may benefit the drug dealers when news of possessing a non-controlled drug of abuse not leading to any criminal prosecution spread. Apart from this, there is also a growing concern that the drug dealers may use the knowledge of non-controlled drugs of abuse to their advantage. The on-going legislative process on controlling these non-controlled drugs of abuse is expected to resolve these issues.

The laboratory will continue to monitor the presence of any new non-controlled drugs of abuse and to report them to the NCB. The laboratory also monitors the trend of drugs of abuse and has regular updates with laboratories from neighbouring countries.

~Contributed by the Department of Scientific Services, BRUNEI DARUSSALAM~

Ketamine Mooncakes and Cereals

Although the abuse of heroin is still a major problem in Macau, ketamine is also fast arising to become a significant drug of abuse in Macau.

For the first time, about 11 kg of ketamine carefully concealed in mooncakes and cereals was seized by the Macau Judiciary Police. According to some reports, this seizure was meant for Mainland China since the Mid-Autumn Festival was just around the corner. This is the biggest seizure encountered in Macau involving ketamine.

Fig. 1: Ketamine concealed in mooncakes and cereals

~Contributed by the Forensic Laboratory, MACAU SAR~

Illicit Use of Pharmaceutical Drugs in Vietnam

The successful law enforcement efforts against the drugs of abuse have led to a shortage of drugs such as heroin and methamphetamine tablets, which in turn have caused the increased illicit use of some pharmaceutical drugs, as highlighted below.

Tramadol

Although Tramadol is not controlled under the International Conventions 1961, 1971 and 1988, this drug is controlled as a *Narcotic Analgesic* under the Vietnam Ministry of Health decree Nr. 2033/1999/QD-BYT, 9 July 1999. Most of the Tramadol seized came from the northern border although a small amount was illegally imported into the country by air.

There were three cases totalling about 100 tablets containing Tramadol seized in the year 2005 while there were only two cases seized in 2006. Tramadol comes in different types of tablets as well as capsules. Some of the tablets have the logo "Ω" and "T1" imprinted on the tablets while the capsules only have the logo "Ω". These tablets and capsules typically contain 50 mg or 100 mg of Tramadol. Fig. 1 shows some foil packages and different types of Tramadol tablets. Analysis of these tablets containing Tramadol was by FTIR (Fig. 2) and GC/MS.

Fig. 1: Some foil packages and Tramadol tablets

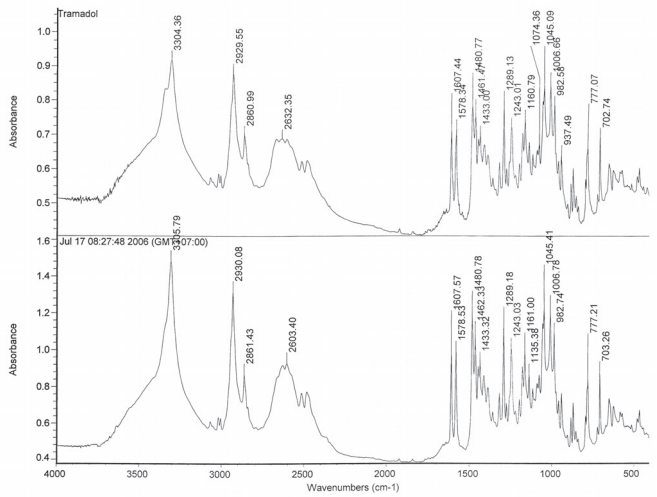

Fig. 2: FTIR spectra of Tramadol reference standard (top) and sample (bottom)

Drotaverine

Drotaverine is an antispasmodic agent with smooth muscle relaxant properties. The laboratory received one case containing 37 ampoules of liquid. The labels containing the name of drug were removed from these ampoules (Fig. 3). Analysis of the liquid from the ampoules was by HPLC/MS (Fig. 4) and FTIR (Fig. 5). The commercial tablet NO-SPA which contains Drotaverine was used as the reference standard for analysis.

Fig. 3: A seized ampoule without label which was found to contain Drotaverine

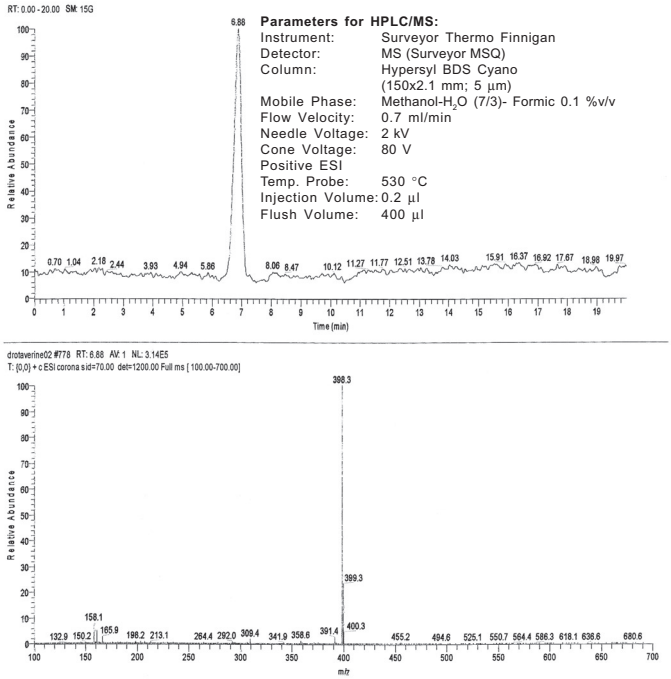

Fig. 4: HPLC/MS analysis of Drotaverine (molecular m/z ion: 398.3)

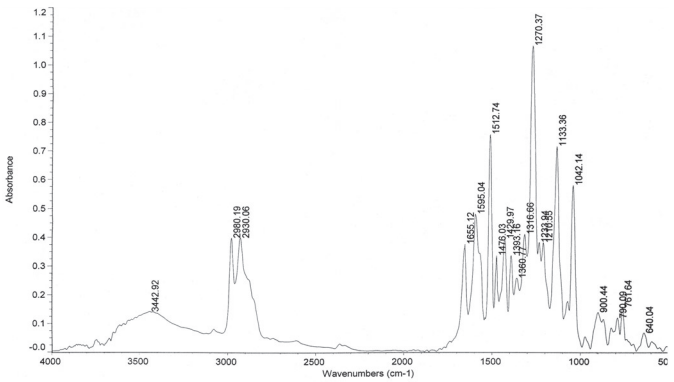

Fig. 5: FTIR spectrum of Drotaverine using KBr disk

Carbamazepine

Carbamazepine is controlled under the Toxic Substances Table B in Vietnam. Carbamazepine is an anticonvulsant which is used in the treatment of psychomotor epilepsy. The laboratory received one case containing about two hundred tablets. UV analysis of the seized tablets showed two maximum absorptions at 236.7 and 285.1 nm. Fig. 6 shows the FTIR spectrum of Carbamazepine.

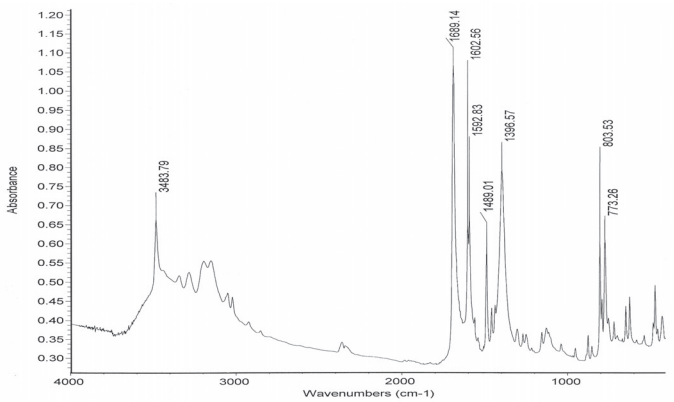

Fig. 6: FTIR spectrum of a seized tablet containing Carbamazepine

~Contributed by the Institute of Forensic Science, VIETNAM ~

Characterisation and Impurity Profiling of "Yaba" Tablets

Since 2004, the Chemical Examiner's Office at Yangon has been collecting forensic data on seized "Yaba" tablets submitted to the laboratory for analysis.

The following data were collected for each type of tablets: source (area where seizure was made), date of seizure, colour of tablet, logo and description, weight of tablet, diameter, thickness, % methamphetamine HCl and % caffeine.

Logo	WY	R	R3	R^2	99	555	"gold"	Total
2004	10	-	-	-	-	-	1	11
2005	44	4	-	1	-	1	1	51
2006 (to June)	26	1	1	-	1	-	-	29

Table 1: No. of "Yaba" tablet cases and types of logos encountered from 2004 to June 2006

Fig. 1: Logos of some "Yaba" tablets

Fig. 2: Variations of "WY" markings

DMA in "Yaba" Tablets

Recently, the laboratory encountered three "Yaba" tablet cases containing an "unknown" substance tentatively identified as dimethylamphetamine (DMA).

The first and second case comprised 3,000 and 12,000 "WY" tablets while the third case involved 447 "R^2" tablets. The "WY" tablets contained about 4% methamphetamine HCl while the "R^2" tablets did not contain methamphetamine. Simon's test was positive for the "WY" tablets and negative for the "R^2" tablets while the Marquis test was positive for all (orange). The GC/FID chromatogram and instrumental settings are shown in Fig. 3.

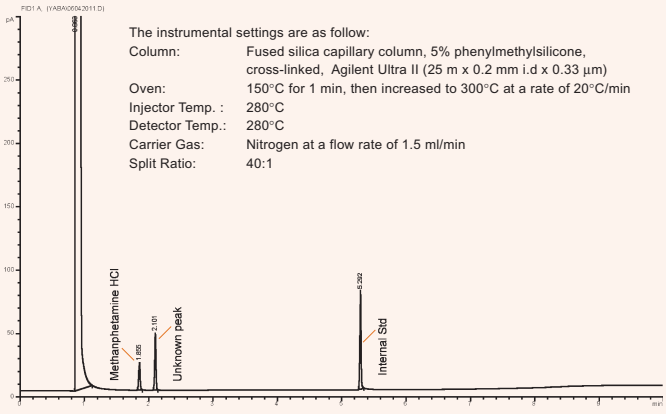

Fig. 3: The instrumental settings and GC/FID chromatogram of a "Yaba" tablet

~Contributed by the Chemical Examiner's Office, Yangon, UNION of MYANMAR ~

Updates from the Philippines

N-Methylephedrine

Two plastic sacks of a white crystalline substance weighing a total of about 108 kg were submitted to the National Bureau of Investigation (NBI) laboratory in Manila (Fig.1). These were seized by law enforcement officers who had arranged to buy the two sacks of "ephedrine" for 1.5 million pesos in an undercover operation.

Fig. 1: Plastic sack containing N-methylephedrine

The substance was tested positive for ephedrine with the Chen Kao reagent while the Marquis and Simon's tests were negative. (*Simon's reagent does not react with ephedrine or pseudoephedrine because their structure contain a hydroxyl group that is in close proximity to the amine group*[1].) This substance was later identified as N-methylephedrine hydrochloride by solubility test, anionic test, GC/MS and FTIR.

N-Methylephedrine is not controlled under "The Comprehensive Dangerous Drugs Act 2002" of the Philippines. In the Merck Index, N-methylephedrine is classified as an analeptic, a stimulant to the central nervous system. N-Methylephedrine can be used as a precursor in the synthesis of N, N-dimethylamphetamine (DMA).

Abuse of Inhalants

In 2005, there were 283 cases of inhalant abuse (accounting for about 5% of all cases received by the NBI laboratory). Inhalants in most cases involved solvents used in glues and samples submitted to the laboratory include blood and urine specimens. Identification of inhalant(s) was by headspace GC/MS.

The instrumental settings are summarized below:

- HP 6890 GC in tandem with MSD
- Column : HP-5MS 5% Phenyl methyl siloxane
- Oven Temp. : 60 °C
- Injector Temp. : 150 °C
- Ion Source Temp. : 280 °C
- Carrier Gas : Helium
- Internal Standard : Dioxane

The GC/MS/SIM mode target ions for toluene were 51, 65 and 91 and for dioxane were 58 and 88.

Clandestine Methamphetamine Laboratories

Eleven clandestine laboratories were each dismantled in 2003 and 2004. Among the precursors/ chemicals seized were ephedrine, pseudoephedrine, phenyl-2-propanone, thionyl chloride, palladium chloride, red phosphorus, iodine, sodium hydroxide, acetone, sodium acetate, chloroform, calcium carbonate, hydrochloric acid, ether and activated charcoal. In 2005, four clandestine storage facilities used to store chemicals/precursors and drug production paraphernalia were uncovered.

Reference:
1. O'Neal, *et al*. Validation of twelve chemical spot tests for the detection of drugs of abuse. *For. Sci. Int.,* 109 (2000), 189-201.

~Contributed by the National Bureau of Investigation Laboratory, PHILIPPINES ~

Cocaine Abuse in Hong Kong

Introduction

Recently, Hong Kong has experienced an overall decrease in dangerous drug seizures, except for cocaine. Cocaine, which used to be an abused drug for the rich, has become more popular in Hong Kong. The reasons may be due to a general fall in cocaine prices as well as the popularity of the drug among the teenage users. It has been reported that more young people are now making the switch to cocaine from drugs like ecstasy and ketamine.

At present, heroin is still the leading drug of abuse in Hong Kong. In 2005, cases involving heroin made up 24.7% of the yearly examination output, followed by cannabis (18.1%), ketamine (17.1%) and benzodiazepines (12.5%). Cocaine came fifth (8.7%).

Cocaine Examination by the Laboratory

The number of cocaine cases examined from 2001 to 2006 (Jan-Jun) is shown in Fig. 1. It is found that the number of cases submitted to the laboratory for cocaine examination has increased significantly in 2004 and 2005. The growth in cocaine examination persisted in the first half-year of 2006, with the number of cases approaching 70% of last year's.

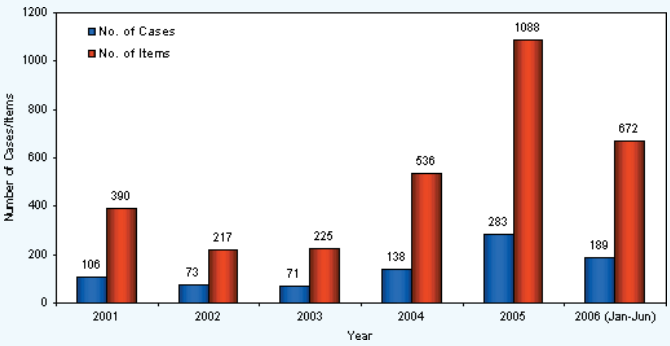

Fig. 1: Number of cocaine cases examined from 2001 to 2006 (Jan-Jun)

Illicit Forms of Cocaine

There are two illicit forms of cocaine prevailing in Hong Kong, namely the hydrochloride salt and the 'Crack', with the former being the main form of consumption. Recently, smoking of 'Crack' is becoming more popular. In the first half-year of 2006, 66 out of 189 cases involving cocaine examination were related to 'Crack'.

Cocaine hydrochloride is usually sold in purity of 70%-80% with lactose and mannitol as the common additives, though diltiazem has been occasionally encountered. The purity of 'Crack' is even higher than that of the hydrochloride form, at above 90%.

'Crack' Production

In 2005, the laboratory attended to four scenes of 'Crack' production which contributed to 40% of the yearly scene investigations. In the first half-year of 2006, laboratory staff had already visited five such scenes, contributing to 45% of the scene investigations for the period. The process that is commonly used involves the reaction between cocaine hydrochloride and sodium bicarbonate, usually in test tubes. A typical scene of 'Crack' production is displayed in Fig. 2.

Cocaine Purification

The laboratory had also encountered a scene of cocaine purification. The case involved crude cocaine base concealed in fish meal which had been smuggled into Hong Kong. A Peruvian was employed to carry out the purification steps at a fish farm. Chemicals and solvents for cocaine purification, such as potassium permanganate, sulphuric acid and kerosene, were found at the scene (Figs. 3 & 4).

~Contributed by the Government Laboratory, HONG KONG SAR~

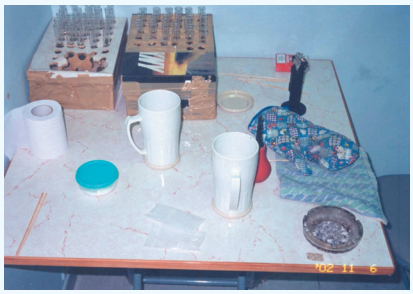

Fig. 2: Set-up for 'Crack' production at a scene

Fig. 3: Cocaine purification at a fish farm

Fig. 4: Purifying cocaine in a tank