

# UNDERSTANDING CLANDESTINE SYNTHETIC DRUGS

## INTRODUCTION

**T**rends in drug abuse frequently follow a cycle whereby individual drugs or consumption patterns re-emerge at different times and/or in different regions. Understanding those trends and their underlying dynamics can therefore contribute to improving policy responses and early reactions to the repetition of previously known problems.

In contrast to the long history of abuse of plant-based drugs such as heroin and cocaine, it is only over the past decade that the 'synthetic drug phenomenon', i.e., the widespread recreational use of certain psychoactive drugs by a mostly young consumer population, frequently as part of a certain life-style or sub-cultural group identity, has become an issue of global concern. While it is now clear that certain clandestine synthetic drugs are rapidly spreading around the globe, there are still considerable differences in the magnitude of the problem, both in geographical terms, as well as with regard to consumer populations.

This paper is intended to provide an overview of and background information on clandestine synthetic drugs. The emphasis is on the intrinsic characteristics of their illicit manufacture, trafficking and abuse, compared to heroin and cocaine. The role and complex interplay of those characteristics in the evolution and geographical spread of the current synthetic drug phenomenon are described, and past and current trends are examined in order to identify possible future developments.

## CLANDESTINE SYNTHETIC DRUGS: EVOLUTION OF A PROBLEM

### From 'plant-based' to 'synthetic' drugs

The modern drug problem evolved gradually from the use of crude plant products/preparations of relatively low psychoactive potency for ritual, spiritual or healing purposes. With the advancement of natural science and pharmaceutical technology, it became possible to refine the (psycho)active compounds (e.g., morphine, cocaine) of the crude plant products (opium and coca

leaf respectively). With the availability of the pure active principle, more reliable and specific medical applications became possible, although therapeutic use of those substances was still dependent on the availability of the plant raw material. It was only in the late 19th and early 20th centuries, when pharmaceutical research and industry reached a reasonable size and level of sophistication, that the synthetic manufacture of therapeutic drugs began to compete, in terms of cost-effectiveness, with the isolation of active principles from natural raw materials. As a result, it became possible to manufacture the pure active principles of several traditionally-used plant-based products in laboratories around the world<sup>a</sup>, for the most part using easily available and cheap chemical starting materials, and to make many of those medications available at low cost to large sections of society (The main developments in the evolution of the modern drug problem are shown in Figure 2 below).

The search for drugs with identical or similar therapeutic effects, yet with higher potency or improved specificity, i.e., with fewer undesirable side-effects, marked the next stage in the evolutionary process. The principle of modifying the chemical structure of a given, well-studied parent molecule, known as drug design or drug modeling, is a basic concept in modern pharmaceutical research and industrial manufacture. An example of modern synthetic drugs modeled on the structural features of morphine is a group of synthetic opioids, the fentanyl, which are used as analgesics (painkillers) and in anaesthesia.

The early days of synthetic pharmaceutical drugs were characterized by a general enthusiasm for virtually all new products. This, together with the easy availability of some medicines, lax prescribing practices and/or over-prescription, caused a somewhat careless use of these drugs. Gradually, awareness of and concern for the potential dangers associated with the widespread use of some psychoactive medicines began to grow. Regulatory restrictions were introduced, medical use was gradually discouraged, and subsequently started to decline. Diversions from licit into illicit trade then became the major source of supply for non-medical use.

a) In some cases, it can still be more cost-effective to isolate the active principle (e.g., morphine) from the plant material, even though the required synthesis technology is available.

### Box A Classes of drugs ('plant-based' versus 'synthetic')

Broadly speaking, there are two major classes of drugs, 'synthetic' drugs, and 'plant-based' (or 'botanical' or 'natural') drugs. Although the term 'synthetic drug', is nowadays frequently equated with 'ecstasy'<sup>b</sup> or 'amphetamine-type stimulants', it covers, in fact, a much broader spectrum of man-made substances. The distinctive feature of synthetic drugs, as opposed to plant-based drugs is that they are synthesized in a chemical laboratory, usually from 'off-the-shelf' chemicals (so-called precursors or starting materials). Plant-based drugs, by contrast, are obtained by refining or processing the plant material.

Synthetic drugs can be copies of substances occurring in nature, they can be modifications of such naturally occurring substances, or they can be entirely new creations with no natural counterparts. This implies that almost every substance can also be synthesized in a chemical laboratory (see Figure 1), i.e., it is the *process* of obtaining a given drug, which differs between natural and synthetic drugs, namely extraction/isolation from the plant material, or multi-step chemical synthesis from various simpler chemicals (precursors). When natural precursors are used in the manufacturing process, the resulting products are called 'semi-synthetic' drugs.

Examples of plant-based drugs are cocaine and morphine, the active principles in coca leaf and opium poppy respectively<sup>c</sup>. Heroin is sometimes also considered 'plant-based', although it is produced by minor chemical modification of morphine, and should therefore be more accurately classified a 'semi-synthetic' drug. The group of synthetic drugs comprises, for example, the stimulants amphetamine and methamphetamine, ecstasy, the depressant drugs methaqualone (known as Mandrax), various benzodiazepines (commonly known under such trade names as Valium or Librium), and synthetic painkillers related to fentanyl, to name but a few.

The further tightening and extension of control measures prompted the establishment of clandestine laboratories in which, in order to meet illicit demand, illicit manufacturers synthesized copies of the desired products from the very same chemicals used in the pharmaceutical industry<sup>d</sup>.

The last phase in the evolution of the modern drug problem was the 'design' of new drugs based on the chemical structure of a parent substance, which produced the desired effects. This principle is very similar to that of pharmaceutical research. However, while the aims of the pharmaceutical industry are to develop safer medications or to increase specificity for a given

type of desired therapeutic effect, the goal of clandestine manufacturers is to create substances with pharmacological profiles that are sought after by the user population.

Clandestine manufacturers are also driven by the desire to create substances that fall outside national and/or international control regimes in order to circumvent existing laws and to avoid prosecution. These clandestinely manufactured, so-called 'designer drugs' are sometimes also referred to as 'synthetic drugs of the second generation' since they are not

simply illicitly manufactured copies of existing substances, but entirely new creations in the clandestine sector<sup>e</sup>.

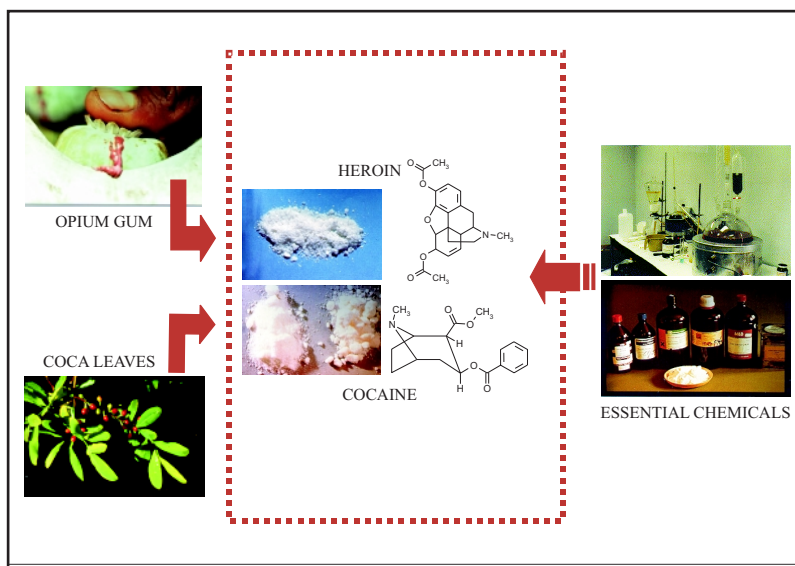


Figure 1: Heroin and cocaine can be obtained from natural sources or by chemical synthesis.

b) Throughout this chapter, the term 'ecstasy' is used to describe any of a group of related substances which are sold on the streets as 'ecstasy'; ecstasy refers to the chemical substance MDMA.

c) In the context of this paper, 'plant based drugs' means cocaine and morphine/heroin. It does not refer to the plant materials themselves (coca leaf and opium), and therefore, does not include cannabis either.

d) This description of 'evolutionary states' reflects the development in many developed countries starting in the first half of the 20th century. While the sequence applies to the global level as well, exact dates vary from one geographical region to another.

e) While the consumption of illicitly manufactured drugs always carries the risk of adverse reactions to by-products generated during the synthesis process, designer drugs carry the added risk of side effects of unknown severity in response to the new drugs themselves. Users are thus offering themselves as experimental subjects for drugs which have not undergone any quality control during their manufacturing process, and which have never been tested adequately in humans.

There are five major classes of designer drugs:

- (i) synthetic opioids,
- (ii) phencyclidine (PCP) derivatives,
- (iii) tryptamines,
- (iv) methaqualone derivatives, and
- (v) phenylalkylamines (PAAs).

Most synthetic opioids are close chemical relatives of fentanyl or pethidine (meperidine). Fentanyls appeared on the street in response to the diminished availability of heroin in the late 1970s / early 1980s. They were consequently marketed as 'synthetic heroin', yet were several hundred times more potent than heroin itself. As a result of their great potency there were many cases of overdose and death, and fentanyls soon lost popularity. The second group of synthetic opioid derivatives subject to clandestine modification are pethidines. Abuse of pethidines is associated with the most serious designer drug catastrophe so far, when a neurotoxic reaction to a pethidine by-product led to irreversible Parkinsonism among young intravenous drug abusers in the early 1980s. PCP derivatives, which are based on the molecule of the general anaesthetic phencyclidine, came to the attention of drug control agencies in the latter part of the 1960s. As a consequence of their strong hallucinogenic and frequently bizarre effects, their use never

became particularly widespread. Tryptamines are another group of hallucinogenic compounds that lend themselves to structural modification. They are related to LSD in chemical structure and, like LSD, were fairly popular during the 'psychedelic' years of the 1960s. Clandestine modifications of the central nervous system depressant methaqualone, despite relative ease of synthesis, have made only a limited appearance on the streets. By contrast, various substances related to amphetamine in their chemical structure, the phenylalkylamines, have been seen on the streets in several waves since the mid-1960s. The latest wave started in the mid-1980s / early 1990s when various amphetamine-type stimulants (ATS) made their appearance on the dance drug scene. For a number of reasons, the ATS phenomenon in all its dimensions exemplifies the peculiarities, on both the demand and supply side, of clandestine synthetic drugs in general.

**Amphetamine-type stimulants: a case scenario<sup>[1]</sup>**

*Social and geographical spread of ATS abuse*

Immediately after their introduction into medical practice in the 1930s, amphetamine and methamphetamine - considered to be the parent drugs of the ATS group -

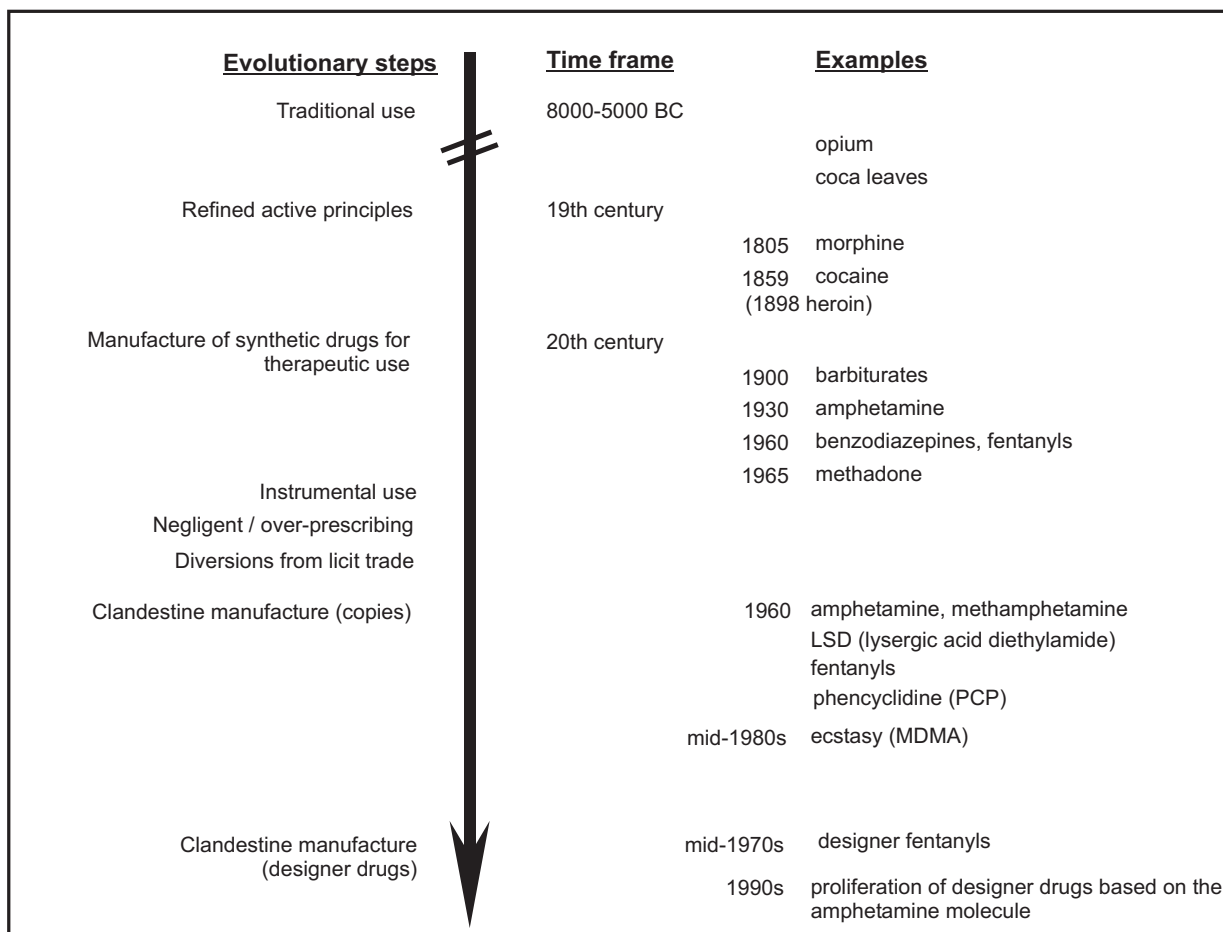


Figure 2. Clandestine synthetic drugs: Evolution of a problem.

began to be used for non-medical purposes. Lax prescribing, together with instrumental use among soldiers during the Second World War contributed to the subsequent spread of abuse among the general public. Abuse started among occupational groups, moved on to students and athletes and then to recreational users. Chronic abuse in a core group of heavy abusers became a problem in a few countries, notably in northern Europe and Japan. Epidemics of non-instrumental use of ATS usually started among *avant garde* sections of society, spread through the middle classes and finally reached the marginal sections of society.

In geographical terms, ATS abuse gradually spread from a few countries, including Sweden, Japan, and the United States, to neighbouring countries within the same regions, and then to other regions as well. Since the mid-1990s, and subsequent to the start of the 'ecstasy' epidemic in Europe, abuse of ATS has been perceived as a global phenomenon, although with different substances predominating in different parts of the world (see Figure 3). Today, recreational use of ATS is most prevalent in several developed countries, particularly in Europe, but is also increasing rapidly in other regions, in particular in South-East Asia, where instrumental use, for example by long-distance truck drivers, used to be the prevailing pattern of use.

#### *Sources of supply*

In the early days, when amphetamines were considered a panacea for many ailments, non-medical use of ATS was facilitated by over-prescribing and negligent prescribing practices. With potential dangers associated with the widespread use of ATS becoming a matter of concern, and with regulatory restrictions being introduced, large-scale diversions from licit trade soon became the principal source of supply to meet non-medical demand. From the early 1970s, the application of more stringent controls on several traditional ATS led to what is often called the 'balloon' effect, i.e., the displacement of supply from one source to another. In this case, the 'balloon effect' refers to the displacement from the licit to the illicit sector, leading to the emergence of clandestine manufacture, initially of amphetamine and methamphetamine, and later of structurally modified designer ATS.

With the extension of control measures to cover the manufacture of starting materials, another facet of the 'balloon' effect became apparent, i.e., the shift from one well established precursor to another, followed by the displacement of clandestine manufacture to a neighbouring country where control measures were less stringent. The shift in the United States in the 1980s from

1-phenyl-2-propanone (P2P; also known as benzyl methyl ketone, or BMK) to ephedrine as key precursors for methamphetamine synthesis, and the subsequent displacement of clandestine methamphetamine manufacture to Mexico, illustrate such 'ballooning'. Another example of 'ballooning', linked to the introduction of stricter controls, is the historical displacement, from the 1950s onwards, of clandestine manufacture of methamphetamine from Japan to Korea, the Philippines, and later to China.

Today, in most regions where consumption figures are high, clandestine synthesis is the main source of supply of ATS for the illicit market. Advanced stages of 'innovative' clandestine drug design are currently underway in Europe and, to a lesser extent, in North America and Australia. In several Asian countries, clandestine synthetic drug manufacture has entered the first stage in the illicit copying of existing drugs such as methamphetamine and, more recently, ecstasy. By contrast, the situation in many developing countries - in particular African and Latin American countries - is still characterized by oversupply, including lax prescribing practices and the availability of pharmaceutical drugs through unregulated channels. In those regions there is a risk that the history of Europe, the United States and Japan in the 1960s and 1970s may be repeating itself: oversupply may be followed by clandestine synthesis, initially by the copying of existing pharmaceutical drugs, and eventually by the manufacture of structurally-related 'designer ATS'.

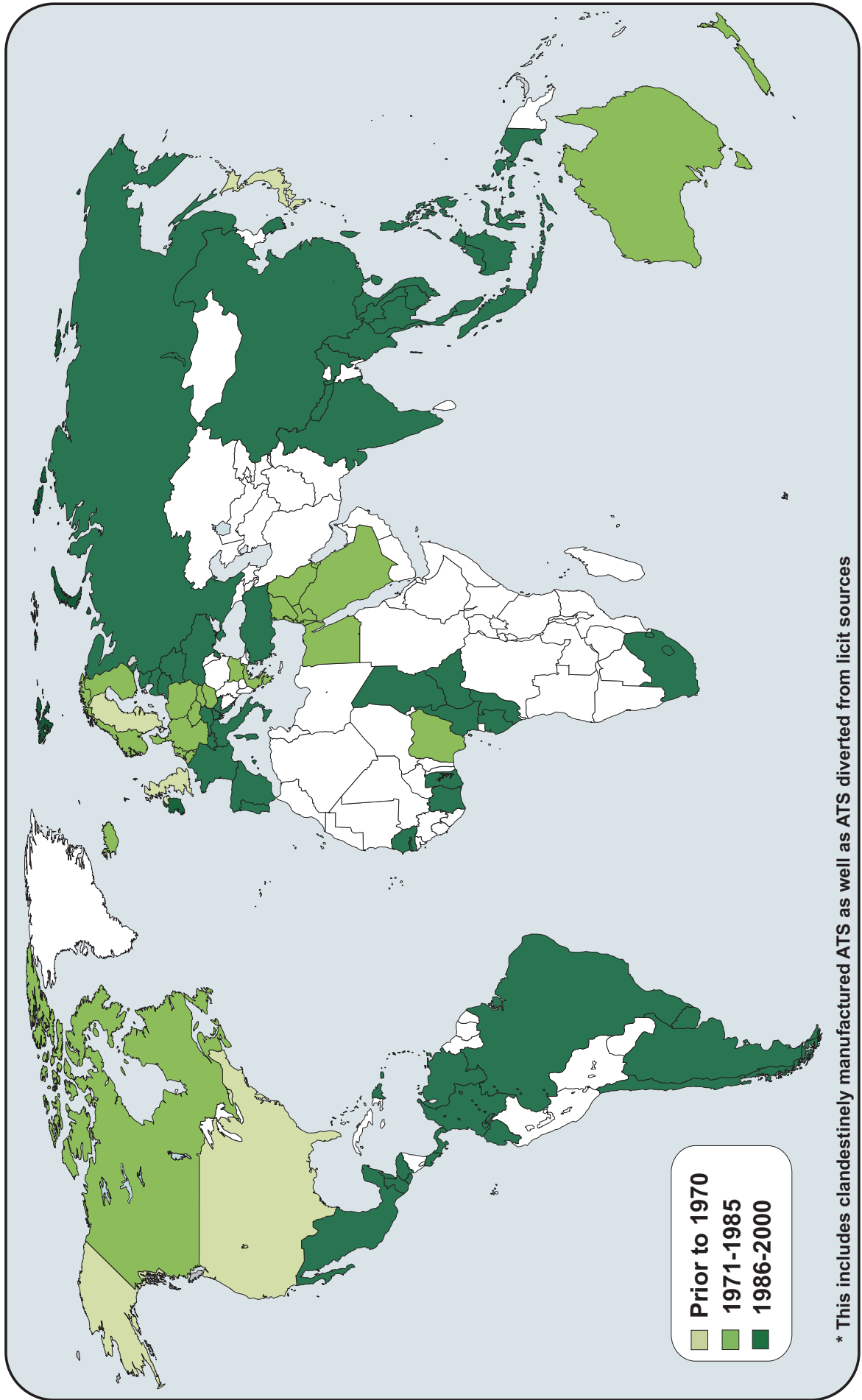
#### **CLANDESTINE SYNTHETIC DRUGS VIS-À-VIS PLANT-BASED DRUGS**

Against the background of the ATS case scenario described above, the following section looks at the complex interrelationship between incentives and disincentives on both the demand and the supply side for different types of drugs. It also analyses some of the underlying characteristics that drive drug supply and demand, highlighting major differences between plant-based drugs (as illustrated by the cases of heroin and cocaine) and synthetic drugs (see also Boxes B and C).

On the supply side, one crucial factor for a clandestine operator is the availability of, and access to, the required starting materials. While the production of the classical plant-based drugs, heroin and cocaine, is dependent on natural raw materials only produced in certain geographical locations, manufacture of synthetic drugs typically requires starting materials that are most often readily available worldwide. The chemicals concerned are usually cheap and the desired end-product can be produced in a few simple reaction steps. Lengthy and

f) It should be noted that for some groups of synthetic drugs natural raw materials are also available, for instance, ephedrine for the manufacture of methamphetamine or methcathinone, or certain saffrole-containing essential oils for some ecstasy-type substances.

Figure 3. Historical spread of abuse of amphetamine-type stimulants\*





**BOX B: Specific differences in the manufacturing process of synthetic and plant-based drugs, which contribute to the attractiveness of clandestine synthetic drug manufacture:**

- (i) the relative volume of starting materials required is considerably smaller in the case of synthetic drugs;
- (ii) the immediate precursors of synthetic drugs are comparable, in terms of processing stage, to the intermediate products coca paste and morphine. Clandestine synthetic drug laboratories are therefore comparable to laboratories processing the final stage of the conversion of morphine into heroin, or coca paste into cocaine (see Figure 4 below);
- (iii) the scale of production of synthetic drugs is very flexible: depending on the drug to be synthesized, clandestine laboratories can be 'kitchen'-type for personal supply using primitive technology and often literally set up in domestic kitchens; or they can be elaborate, purpose-built constructions with the latest technical equipment. Clandestine synthetic drug laboratories can thus easily be set up in the form of makeshift laboratories supplying a single order, and then dismantled to prevent detection;
- (iv) while for plant-based drugs one starting material yields one end-product, clandestine synthetic drug manufacture is more flexible in terms of number of synthesis routes, alternate precursors and end-products;
- (v) while the production process of plant-based drugs is essentially an extraction / isolation process, i.e., the end-products, cocaine and morphine, are present from the very beginning, the synthetic end-products are only constructed during the final stages of the synthesis. This reduces the risk of detection, while at the same time, it makes the seizure of a clandestine synthetic drug laboratory an effort requiring precise timing (not before the end-product is finished, not after it has been distributed) in order to prove that synthesis actually did take place;
- (vi) the large number of structural modifications with similar pharmacological profiles, which can substitute for one other (designer analogues) offers the opportunity for clandestine experimentation or 'research' which frequently cannot be countered by existing laws in many countries;
- (vii) the possibility of manufacturing tailor-made synthetic drugs allows clandestine chemists to satisfy particular consumer needs and to respond quickly to changes in fashion/consumer preferences once they have recognized a market potential. By contrast, the scope for clandestine 'innovation' related to plant-based drugs is very limited and largely restricted to changes in the presentation/mode of administration of the drug.

labour-intensive harvesting and extraction/isolation procedures are not required, and risks associated with the protection of cultivation areas do not exist.

Another important factor is the access to information and to the required scientific and technical know-how. 'Recipes' for the manufacture of synthetic drugs are widely available through specific underground literature, or through the Internet. In fact, modern information technology plays a crucial role in the spread of clandestine drug synthesis by offering any lay person answers to questions such as: what chemical precursors to use; where to get them; how to evade detection; and how to set up a simple 'kitchen' laboratory. All of this is compounded by the fact that a typical synthesis is relatively simple in terms of number of reaction steps required and the technology involved. Synthesis yields are usually high.

The global spread of certain synthetic drugs over the past decade can also be attributed to economic incentives that affect their manufacture, trafficking and, ultimately, abuse. On the supply side, the profitability of synthetic drugs, in the consumer markets, is frequently higher than that of cocaine or heroin. Not restricted to

specific geographical areas, the manufacture of synthetic drugs can easily occur close to the place of final consumption<sup>9</sup>. As a consequence, almost all of the total retail price of a synthetic drug remains in the region where the drug is consumed. In addition, the close vicinity of places of clandestine manufacture and consumption reduces the risk of detection, for example, at border crossings and because it enables trafficking in smaller quantities. The facts that synthetic drug laboratories are less conspicuous also contributes to reducing the overall risks for clandestine operators, when compared with illicit cocaine or heroin production.

On the demand side, several factors influence the final decision of a user to choose a particular drug. The pharmacological characteristics of the drug itself, i.e., the sought-after effects of the drug weighed against its undesirable side effects and risks, inasmuch as they are known to the user, probably play a significant role. Similarly, the suitability of a drug for administration routes other than by intravenous injection and, increasingly, methods other than smoking, also seem to be contributing factors. Other elements include cultural, social and economic considerations, the image and social representation of individual drugs, and the

<sup>9</sup> This is particularly true for 'ecstasy' and amphetamine in Europe, and for methamphetamine in the United States. Exceptions are the trafficking of 'ecstasy' from Europe to Australia, South-East Asia/Far East, and the United States. Demand for methamphetamine in the Far East is met by supply from within the region.

**BOX C: Intrinsic characteristics of synthetic drugs contributing to their attractiveness to consumers vis-à-vis the traditional plant-based drugs:**

- (i) many synthetic drugs can be taken by mouth. In addition to being 'convenient' for the user, the use of pills also avoids injection or smoking and the dangers or social stigma associated with these administration routes;
- (ii) compared to heroin and cocaine, the use of which has been stigmatized among drug users as well as the general public, the recreational use of synthetic drugs, is generally perceived as being less harmful, and controllable. Since several synthetic drugs are used to enhance performance or cope with difficult /unpleasant situations (tension, stress, depression and so on), they are often perceived as being beneficial to the individual rather than destructive;
- (iii) with the internationalization of societies and in an increasingly technology-oriented world, synthetic drugs are frequently seen as representations of technological advances, of modernism, affluence and success.

availability/accessibility of alternative substances. The situation is, therefore, more complex on the demand side than the supply side, and consumer preferences may change over time.

Economic incentives on the demand side are likely to become particularly important when there is an alternative substance available that offers the consumer similar pharmacological effects at a lower cost and no higher risk. In pharmacological terms alone, the stimulant drugs cocaine and methamphetamine/amphetamine are competitors for the same user population. Similarly, heroin and fentanyl can compete and used to compete, in the late 1970s/early 1980s, for the same illicit narcotic analgesic (opioid) market. Reality however is far more complex since additional factors such as purity, the duration of the effects and the image of the drugs also play significant roles.

**APPROACHES TO THE CONTROL OF CLANDESTINE SYNTHETIC DRUGS**

The international drug control system is guided by the need to strike a balance between ensuring the availability of substances used for legitimate medical purposes, and preventing their diversion into illicit markets. Procedures to extend control measures to new substances have been carefully formulated, taking into account the need to maintain legitimate trade in those substances for medical purposes. They consist of a monitoring system of licit transactions of individual substances, which are related to manufacture, stocks, trade and use, and estimates for quantities needed for medical and research purposes. In such a system, any inconsistency or change would be apparent and would prompt caution and eventually corrective measures, thus preventing the leakage of a controlled substance into illicit channels.

Clandestine synthetic drugs challenge the current drug control system in several ways:

- firstly, because they are manufactured clandestinely, there is no legitimate trade, and their distribution cannot be monitored by the traditional drug control system;
- secondly, as a result of the so-called substance-by-substance scheduling approach, the appearance of new substances, which are not included in the schedules of the conventions, cannot be countered immediately with appropriate measures, given that their manufacture, trafficking and abuse are not 'illicit', i.e., they do not constitute a criminal offense at that point in time. This offers room for clandestine experimentation or 'research' into individual substances within a class of drugs with similar pharmacological profiles;
- thirdly, as a consequence of the clandestine nature of the substances concerned, there are usually not sufficient data available for the required scheduling assessments. The procedure for their inclusion into the control system is thus a lengthy one, and this allows clandestine manufacturers to continue to operate for some time and sell their products without immediately facing legal consequences.

Through the 1988 Convention, the international community has attempted to strengthen the existing drug control system which mostly focuses on end-products, with legislative tools which also address diversion and the illicit use of starting materials and other chemicals required in clandestine drug manufacture. Precursor control has now become one of the cornerstones of most drug control strategies. It is particularly important in the area of synthetic drugs, given their flexibility within the manufacturing process, and the wide range of starting materials that can substitute for one other.

In addition, before the 1988 Convention came into effect, there had been no international system for the control of precursors for synthetic drugs, not even for the most immediate starting materials. This is in contrast to the situation with plant-based drugs, where the same international control regime (1961 Convention) applies to immediate starting materials (coca leaf, opium), intermediates (coca paste, morphine) and end-products (cocaine, heroin), and only the chemicals required in the extraction and purification processes are monitored through the 1988 Convention. Figure 4 provides an overview of the different control regimes as they apply to plant-based drugs, to synthetic drugs, and to the precursors and other chemicals required for their manufacture.

The large number of legitimate uses, and the frequently large volumes of licit trade also tend to set practical limitations on a particularly strict control system for precursors. Moreover, unlike most end-products, many precursors are manufactured and traded by a large number of companies worldwide. There are, therefore, various sources of licit supply, enabling clandestine operators (i) to adapt quickly to the introduction of

stricter controls in major supplier and transit countries, and (ii) to place orders with several suppliers world-wide simultaneously. As a result, trafficking and diversion routes are highly flexible. Effective monitoring of movements of precursors is also complicated by the variety of shipping routes through a number of intermediaries in different countries, which are used to disguise the final destination of the shipments.

Another trend over the past few years has been the increasing use in illicit drug manufacture of legitimately obtained, non-controlled substances as substitutes for precursors that are already under control. From a drug control perspective, this development gives rise to two problems. First, the large number of potential substitutes makes strict control of the licit trade of such substances unrealistic, and secondly, many of those substitutes have an even broader range of legitimate uses than the 'traditional' precursor substances. The situation is more disturbing with regard to synthetic than plant-based drugs, since even the most essential precursors of certain synthetic drugs can be substituted by non-controlled precursors, or can be synthesized from a non-controlled pre-precursor 'down the chain'<sup>h</sup>. In the

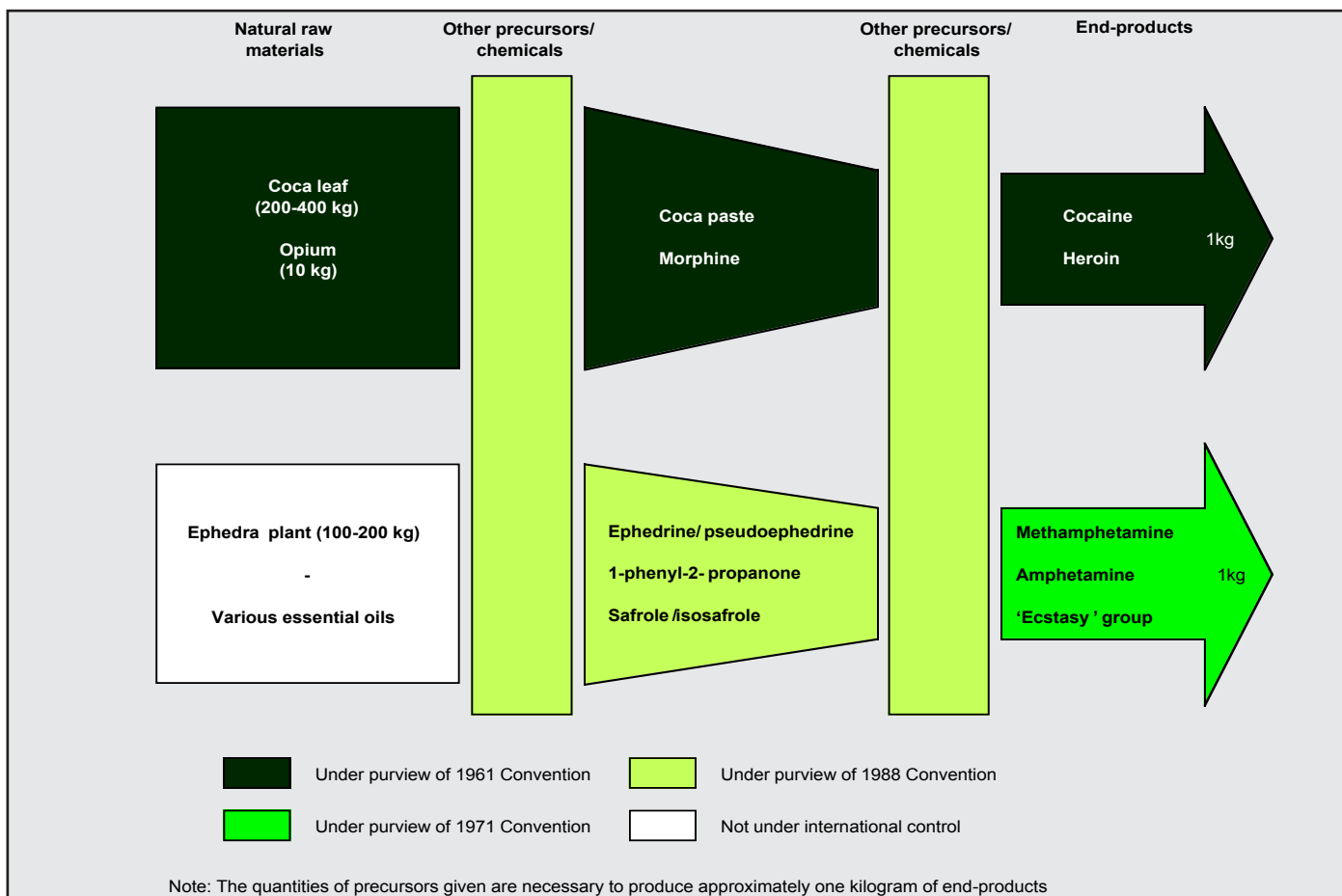


Figure 4. Comparison of processing stages and control regimes of selected plant-based narcotic drugs, synthetic drugs, and their precursors / starting materials.

<sup>h</sup>) Examples are the use of benzaldehyde and benzyl cyanide in the manufacture of P2P and amphetamine.



case of heroin and cocaine, by contrast, only the chemicals for the isolation, conversion and purification can be replaced by non-controlled substitutes, whereas sufficient supply of opium or coca leaf, respectively, is always crucial for their manufacture.

### THE DEVELOPMENT OF A TREND - DEMAND PULL OR SUPPLY PUSH?

Preferences for individual substances (or substance classes) are the result of a complex interplay between cultural, social, economic and other factors. As a consequence, they vary within and between countries, as well as over time. The emergence of a new drug trend seems usually to be the result of clandestine manufacturers exploring the market potential, followed by consumer acceptance. This satisfaction of consumer preference, at a given time and in a given socio-cultural context, is a precondition for the popularity of a new drug. Subsequently, supply may be gradually replaced by demand as the major driving force in an expanding market. For synthetic drugs, on a global scale, most new trends emerged in western countries, notably the United States, and then gradually spread to less developed countries<sup>1</sup>.

Shifts in preferences for individual drugs are correlated to some extent with a change in the social representation of a given substance, which itself may partly be the result of more and more detailed, accurate and exhaustive information on side effects and risks involved in the consumption of that particular substance. In the absence of a sub-cultural memory of the hazards of the use of a given drug, each new generation of users seems to rediscover the pleasurable effects of that drug. This, together with the subsequent rediscovery and dissemination of information on adverse health and psychological consequences is part of the cyclical pattern which characterizes most epidemics of illicit drug use.<sup>12]</sup>

In the case of the classical plant-based drugs, a new trend is largely limited to changes in the route of administration, accompanied by the necessary change in the presentation of the drug (e.g., cocaine and crack cocaine, or heroin hydrochloride and heroin base). As a consequence, only a few products are available to consumers. Synthetic drugs, by contrast, allow for the clandestine manipulation of a 'successful' drug molecule, frequently without changing the pharmacological effects sought after by the consumers, thus opening access to an entire class of related substances. This flexibility makes synthetic drugs highly suitable for situations of changing trends and fashion and, at the same time, a nightmare for law enforcement and forensic chemists.

Globalization and the internationalization of societies appear to have contributed to creating an environment conducive to the spread of clandestine synthetic drugs, both from the supply and the demand point of view. On the demand side, there are at least three phenomena that can be observed over the last decade:

- (i) changes in social structures in many societies around the world, which lead, among other things, to an emphasis on individual success and performance;
- (ii) a growing global trend towards fashionable life-styles, short-lived amusement and a 'consumption culture' which trusts in 'pills' as universal remedies (see also Box D); and
- (iii) the spread of modern communication technology.

While the first two phenomena may translate into distinct consumption patterns, namely instrumental/occupational use to achieve desired goals, and recreational/social use, the last one contributes to the rapidity of the spread of synthetic drugs and to the convergence in consumption patterns in different parts of the world. The media industry and modern communication technology, in particular the Internet, enable fashions to become increasingly global and expand public access to specific information on various drugs, including their effects, where to get them, and the comparison of prices.

### From the demand perspective

Today's situation with regard to the consumption of psychoactive drugs for recreational purposes can be seen in the social context of the 'mass culture' of the youth of the 1990s. Synthetic drug consumption since the beginning of the 1990s has not been associated with distinct social classes of drug users, nor does it appear to have any political dimension. Instead, pleasure-seeking, amusement and fun in a controlled way without any perceived impact on work performance, seem to be at the heart of that drug culture in many countries. As such, consumption of certain psychoactive drugs has become a mass phenomenon: school children and college and high-school students are growing up in an environment where drugs are almost constantly present and where their availability has become the norm. Certain synthetic drugs have become an integral part of mainstream youth culture in many countries where they are used as representations of a fashionable life-style. Among wide sectors of increasingly younger segments of the population of all social strata, synthetic drugs seem to be valued for facilitating communication, socializing with others and for creating a sense of belonging and integration. This is particularly true for the drugs with predominantly stimulant effects which were origi-

<sup>1</sup>) An exception to this trend is methcathinone (ephedrone), an ATS which was seen in St. Petersburg about ten years before it made its first appearance in the USA. Also the current wave of 'ecstasy' consumption in the context of the club and dance culture emerged in Europe, and has only hit the United States much later.

**BOX D: 'Lifestyle products'**

One facet of contemporary consumption culture is the rapidly increasing demand for products which enable people to manage their lives more easily. A vast number of so-called lifestyle products is now available, usually in the form of pills, which can be easily swallowed. They are alleged to increase both the mental and physical well-being of the user, and enable him/her to cope with a variety of 'lifestyle' problems. For instance, the need to enhance mental performance, i.e., concentration, cognition or memory, is reflected in the increasing popularity of so-called 'smart drugs'. 'Smart drugs' or 'cognition enhancers' refer to a group of substances ranging from mixtures of vitamins, minerals and amino acids to pharmaceutical drugs used to treat memory loss associated with ageing. They act by increasing the blood flow to the brain, or by boosting the levels of certain neurotransmitters which play a role in learning and memory. In addition to stimulant effects (like energy drinks), 'smart products' can also have relaxing effects. Use of 'slimming pills', anabolic steroids and doping agents also reflect the need to conform with certain popularly-held views, norms and behaviours. Some authors go even so far as to include Viagra, a prescription medication used to treat certain forms of sexual impotence, in this category, since its popularity can be attributed to the same driving forces behind many of today's lifestyle drugs. Irrational (and frequently unethical) marketing of certain licit medications may thus create an environment where consumption of 'pills', licit or illicit, is perceived as a panacea to cope with any of the stressful problems of modern life.

nally associated with the dance culture. However, the individual drug - or its specific pharmacological effect - might often be less important to the users than the role it plays as a component of a certain lifestyle.

*Drug type*

In terms of pharmacological effects, the current requirements of the synthetic drug market translate into only a few drug classes. These are substances that increase performance, enhance or alter sensory perception and/or facilitate inter-personal communication, and help socializing with others. Current youth values do not seem to favour synthetic drugs with calming effects, which tend to isolate the user. For the (sub)cultural phenomena closely related to the dance drug scene, the overall pharmacology of drugs used continues to be the same, namely a combination of stimulation and enhancement of sensory perception. Apart from their pharmacological effects, the intrinsic characteristics of the substances themselves which also contribute to their suitability for a given consumer population, include the speed of onset and the duration of effects. Considering the current fashion of dance or lifestyle drugs, the duration of action of an 'ideal' future synthetic drug should not be too long, ideally a few hours; it should not produce a 'hangover' the following day, and it should meet the criterion of oral bioavailability, i.e., it must be effective when taken by mouth, perhaps by smoking, although the social acceptance of smoking is steadily declining in several societies.

While not all synthetic drugs meet those criteria, many ATS do, and in view of the reputation and social acceptance some established drugs have gained on the dance drug market, it can be expected that they will continue to

be available, and that they will spread increasingly outside the dance scene. The reputation, in particular, of ecstasy has resulted in several other substances being marketed under that name, and the term 'ecstasy' has increasingly become synonymous with a recreational drug in the dosage form of a tablet. While some of the substances offered for marketing purposes under the name 'ecstasy' are also available as separate entities under their own names like amphetamine and LSD, several others, especially chemically- and pharmacologically-related substances, lack a separate market and consumer identity. Another drug which may experience faster and widespread abuse in the future is gamma-hydroxybutyrate, or GHB<sup>j</sup>. Although structurally unrelated to ATS, GHB was introduced into the market by successfully using the 'ecstasy analogy' marketing concept. It is known to users at dance settings as 'liquid ecstasy', or 'the ultimate drug', which is said to produce euphoric and hallucinogenic effects, to enhance sexual pleasure and to have no 'come-down' effect.

In an environment of constant change in terms of availability of drugs, where a large number of drugs and drug combinations are available simultaneously, polydrug use is common. Such drug use involves the deliberate combination of drugs to alter, strengthen or prolong certain effects, or to alleviate the after-effects of the main drug used. Another aspect is the combination of illicit drugs with certain licit pharmaceuticals, in particular those which slow the metabolic breakdown of the illicit drug in the body, thus prolonging and/or enhancing its effects. The added risks which such consumption patterns bear are significant, and can even be fatal, as there may be unpredictable interactions with other therapeutic agents and even normal biochemical processes in the body.

<sup>j</sup> Note that in March 2001, following a recommendation by WHO, GHB (as *gamma*-hydroxybutyric acid) was included in Schedule IV of the 1971 Convention.

**BOX E: Other classes of synthetic drugs**

Other classes of synthetic drugs which have been synthesized clandestinely in the past are phencyclidine (PCP) and its analogues, including ketamine, synthetic opioids (fentanyls and pethidines) and methaqualone derivatives. However, apart from PCP analogues, widespread consumption of these substance classes does not appear to be likely against the background of current societal norms and values and consumer preferences.

Analogues of phencyclidine are a group of hallucinogens which may become more important in the future. While some of them are still used in veterinary medicine, such as ketamine, and may find their way onto the streets by diversion from licit trade, others may be created in clandestine laboratories. Recreational use of ketamine, for instance, already appears to be increasing in several regions around the world, mainly as part of the 'ecstasy' / party drug market. When offered as a separate drug, it is favoured for its relatively short-term hallucinogenic properties. The ease with which PCP analogues can be synthesized may lead to even more analogues appearing in the future.

By contrast, and as a result of their negative image, the probability that synthetic opioids such as derivatives of pethidine (meperidine) or of fentanyl will regain popularity among consumers in the future is relatively small. For pethidines, the experience of the early 1980s is too well remembered, when several young users destroyed their lives with irreversible Parkinsonism induced by a neurotoxic by-product (MPTP) in a batch of a clandestinely manufactured pethidine derivative. As a consequence, pethidine derivatives are fraught with considerable risk from the inadvertent production of either MPTP or from an as yet unexplored congener also having neurotoxic properties. A similar negative image is associated with the abuse of fentanyl derivatives, which caused numerous overdose deaths in the 1980s as a result of their extreme potency.

Among clandestinely manufactured synthetic central nervous system (CNS) depressants, the only drug with a distinct, though restricted consumer market is methaqualone. Traditionally, supply for illicit markets in southern and eastern Africa used to be met by illicit manufacture in India, but more recently, methaqualone is predominantly being manufactured locally. While consumption of methaqualone has for a long time been chiefly confined to southern and eastern Africa, it appears to be gaining in popularity as 'poor man's ecstasy' in a particular sub-group of the nightclub and dance party scene, for instance, in Australia because of its euphoric, aphrodisiac, and disinhibiting effects in certain individuals. As such, it is particularly popular with gay men, and is usually used together with alcohol.

While PCP analogues, synthetic opioids and methaqualone are usually manufactured illicitly, clandestine manufacture is not necessarily the only source of supply for drugs encountered on the streets. CNS depressants, in particular benzodiazepines, and volatile substances (inhalants) are two major groups of synthetic drugs of abuse which are obtained from licit sources. The attractiveness of benzodiazepines, for example, can be attributed, among other things, to the pharmaceutical-grade of the drugs, i.e., their guaranteed quality and the knowledge about the dose level of the active ingredient, thus assuring the consumer that the same effect can be expected.

For benzodiazepines, two major patterns of misuse are encountered: (i) in the context of therapeutically unjustified overuse and (ii) as part of polydrug use. For instance, benzodiazepines are used in the dance scene after an event in order to recover from the effects of ATS and to avoid an unpleasant 'come-down', particularly insomnia, which may last for several days following ATS consumption. They may also be used to boost the effects of heroin. Another development, which may continue and expand in the future, is the use of some synthetic CNS depressants within the context of committing a crime which involves dazing the victim, prior to robbery or sexual assault (hence the term 'date-rape' drugs). The amnesia (limited loss of memory) following drug intake prevents the victim from recalling details of the crime and of its perpetrator.

Another aspect of the drug market which should not be overlooked is the problem of volatile substance use ('glue sniffing'). This form of drug use certainly has the potential for expansion although in a different consumer population, namely children and teenagers, and in particular from lower income families. None of the inhalant products concerned is under international control, and the majority of these chemicals are commercially available and are legal to possess. In fact, many of them are contained in common household products. Since they are cheap and widely available, volatile substances are the drugs of choice for adolescents in many countries, reflected in lifetime prevalence rates of up to 25 percent (compared to up to 9 percent for 'ecstasy')<sup>[3]</sup>. In contrast to the frequently-held belief that such products are harmless, non-addictive and undetectable, volatile substance use can cause health and social problems of considerable magnitude. Inhalation of many volatile substances produces adverse effects similar to those of central nervous system depressants such as alcohol and barbiturates. From the illicit supply point of view, retailing of such products can be a lucrative business.

The range of drugs which provide the effects favoured by current 'youth cultures', and which are frequently used simultaneously, extends from ecstasy and related substances to stimulants and hallucinogens. In terms of substance classes which may attract attention by consumers in the recreational drug scene, hallucinogens will continue to be strong candidates. The past has shown that ecstasy use may be followed by hallucinogen use as a consequence of users finding the effects of ecstasy insufficiently attractive.<sup>[4]</sup> They then turn either to mixtures containing hallucinogens or directly to hallucinogens. In this context, the resurgence of LSD in the mid-1990s should not be disregarded. LSD appeals to the younger market because it is frequently easy to obtain, often cheap to purchase, and produces a lasting high. Since LSD is now usually available at a much lower strength per dosage unit than in the 1960s, it may also trigger the spread of other mild hallucinogens among young consumers. One group of hallucinogens which may become more popular is the tryptamines. They provide brief and intense 'trips' when smoked or injected, and although some of them have been banned in most countries since the early 1970s, there are reports that some party drug users are experimenting with tryptamines as an alternative to LSD. However, there are drawbacks to tryptamines, including their mode of administration. Some of them have to be smoked, snorted, or injected in order to be pharmacologically effective. In addition, many of them, at common dose levels, are far more hallucinogenic in nature than ecstasy. They may therefore not appeal as much to the youth culture as other party drugs, unless their pharmacological drawback is balanced by a relatively low price.

Considering the overall consumer preferences characterizing the current wave of abuse of synthetic drugs, a similarly widespread consumption of substances of other chemical / pharmacological classes (Box E) in the immediate future seems unlikely.

#### Geographical trends

In geographical terms, the demand for performance-enhancing and dance drugs can be expected to spread along with improvements in standard of living, stronger buying power and free-market economies. The growth of a middle class, accompanied by a growing interest in imported fashions may make certain communities vulnerable to the use of synthetic drugs. Within individual regions or countries, synthetic drug use can be expected to spread both vertically and horizontally, i.e., from higher to lower social strata and from larger cities to towns and rural areas. Falling prices as a consequence of an expansion of the market may further contribute to this development.

'Ecstasy' and related ATS have already been spreading in countries of South and South-East Asia. In China, for instance, and more specifically in Hong Kong, Shanghai, Canton, and in the 'special economic zones', demand for synthetic drugs is rising in night-clubs, dance-halls or Karaoke bars. For similar reasons, i.e., because of their modern image and their generally lower prices compared to traditional drugs, synthetic drugs can also be expected to continue spreading in eastern Europe. Demand for synthetic drugs may also further increase in several countries in South America, where 'ecstasy' has recently become fashionable among youth.<sup>[5]</sup>

#### From the supply perspective

On the supply side, synthetic drugs enable clandestine chemists to follow developments in a consumer market which is subject to trends of fashion and in which the individual drug plays less of a role compared to the rituals/myths surrounding its use. However, a clandestine chemist would not normally want to replace a more potent drug which is well accepted in the consumer population with a less potent one unless he is forced to do so, for instance, by the unavailability of the required precursor chemicals. While staying within the confines of consumer acceptance and preferences, a clandestine chemist will tend, within a group of related substances, to synthesize the drugs which carry the highest profits and have the lowest risks of detection. The focus will therefore be on those substances which have the highest possible potency and which can be synthesized, to the extent possible, from unsuspecting starting materials.

#### Drug type

Several of the substances and substance classes which are attractive to consumers in the recreational drug scene are equally attractive for clandestine manufacturers in terms of level of risk and financial returns. This is particularly true for some synthetic stimulants and hallucinogens, which offer opportunities for structural modification and drug design. However, since consumer acceptance is a factor beyond the direct control of clandestine manufacturers, creating an entirely 'new' substance class involves a certain degree of risk. As a consequence, future trends are likely to evolve from what is already discernable today:

- increased availability of traditional ATS such as amphetamine and methamphetamine, to be used for their performance-enhancing effects;
- re-emergence of other ATS already banned in most countries as a consequence of previous periods of abuse<sup>k</sup>; and/or

k) The most recent example in this context is the re-emergence of PMA (*para*-methoxyamphetamine) in 2000 as part of the 'ecstasy' market. PMA has been under international control since 1986.



**BOX F: Alexander Shulgin and the PIHKAL / TIHKAL dilemma**

PIHKAL and TIHKAL are two books published by Alexander and Ann Shulgin in 1991 and 1997 respectively. Detailed descriptions of the pharmacology and chemistry of phenethylamines and tryptamines are interwoven with autobiographical details about the authors. For almost 30 years, Alexander Shulgin synthesized and evaluated, mainly through self-monitoring, a broad range of psychoactive substances. The first book, PIHKAL, is based on his life's research into the effects of phenethylamines in human beings, hence the acronym in the title which stands for *Phenethylamines I Have Known And Loved* (TIHKAL, by analogy, stands for *Tryptamines I Have Known And Loved*). While valued by some psychotherapists for providing first-hand accounts of the use of a number of psychoactive compounds, the level of detail - which affords the reader a realistic feeling for the effects of the compounds described - worries drug control authorities, who fear that the descriptions could encourage drug use. Of even more concern is the fact that the books offer quasi-encyclopedic compendiums of dosages, durations of action, and syntheses in recipe form for almost 200 chemical compounds of the class of phenethylamines and for more than 50 tryptamines. There is thus justifiable concern that the availability of PIHKAL and TIHKAL may bring a whole range of new substances and precursors to the attention of both consumers and illicit producers. Manufactured under clandestine laboratory conditions, the 'quality' of the substances is very likely to be dissimilar to those described by Shulgin; low purity, presence of impurities and insufficient testing of these street products are major contributors to the considerable health risks they pose for consumers.

- increase in consumption of new designer ATS, or of substances which have so far only appeared sporadically in illicit markets. The so-called phenethylamines (PEAs), which are close chemical relatives of ATS not controlled in most countries, and which can be expected to produce similar effects, can be included in this category.

The only other pharmacological drug class which, like the ATS, lends itself to structural modification (and which may also be attractive in the immediate future from the consumers' point of view), are the hallucinogenic tryptamines. Although their synthesis is usually more complex than ATS synthesis, the availability of the book TIHKAL<sup>[6]</sup>, in the same way as PIHKAL (and other similar underground 'recipe' books), may contribute to new trends in the future (Box F).

*Geographical trends*

In geographical terms, western Europe has been the world's major illicit manufacturing region for amphetamine and ecstasy-type substances during most of the last decade. On the whole, as long as ATS consumption continues in Europe, large-scale production can be expected to continue in this region as well. At the same time, there are indications that 'marketing activities' are being expanded from regional to international consumer markets, e.g., North America, Australia / New Zealand, South Africa, Asia and South America.<sup>[7]</sup>

The extension of clandestine manufacture to eastern Europe, the Baltic States and CIS Member States is also likely to continue as the economic situation in many of those countries is still fragile, expertise and technical capabilities to synthesize drugs are readily available, labour is cheap, and precursors are mostly also easily available.

Illicit manufacture of synthetic drugs also continues to rise in South-East Asia with traditional heroin-producing organizations now increasingly diversifying into ATS, in particular methamphetamine. While many of these products are destined for consumption within the region, an increasing number of seizures of South-East Asian methamphetamine - mostly from Thailand - were made in Europe, and more recently also in the United States<sup>[8]</sup>. This indicates the reversal of a trend which has been true for some time for 'ecstasy', with the drug being exported from Europe to South-East Asia. There are now also indications that clandestine manufacturers in South-East Asia may soon be able to produce high quality 'ecstasy' comparable to that imported from Europe. As a consequence, prices can be expected to go down, thus making the drug affordable to larger segments of society. This may be a concern particularly in China, where seizure data indicate that the country has become important as a point of distribution of various synthetic drugs.

A similar trend to that seen in South-East Asia may eventually also emerge in some Latin American countries, where demand for 'ecstasy' is already evolving. Africa, by contrast, with the exception of South Africa, does not appear to face a risk of a major clandestine synthetic drug manufacture in the immediate future, as the situation in that region is still characterized by the availability of pharmaceutical drugs through unregulated channels (parallel markets).

As pointed out earlier, trends on the demand side are mainly driven by the drugs themselves, their representation, and intrinsic characteristics, such as overall pharmacology, suitability for certain mode of administration, duration of action, etc.. On the supply side, as well as the drugs themselves, there are other factors that have an impact on trends in clandestine manufacture and



**BOX G: Other likely developments on the supply side of clandestine synthetic drug manufacture and trafficking**

A) A diversification in the clandestine sector aimed partly at avoiding possible detection by ordering monitored chemicals, and partly at making up for the shortages in some essential precursors which have occurred as a result of increased alertness and monitoring within the industry. Activities may include:

- the search for substitutes of essential, yet controlled precursors;
- the synthesis of controlled precursors from so-called pre-precursors;
- investigations into alternative synthesis routes for a given end-product;
- an increase in the use of natural raw materials to obtain the required precursors;
- the use of non-controlled chemical modifications of precursors (so-called 'hidden precursors'), which can be easily converted, usually in one single step, into the primary, controlled chemical;
- the illicit manufacture and trafficking of drug intermediates, which are usually not included in any control regime; and
- the recycling of used chemicals.

In the longer run, stricter precursor legislation may thus force more clandestine chemists to synthesize their own starting materials or use less well described synthesis routes. An increased level of such activity may lead, subsequently, to the presence of more by-products/impurities of unknown toxicity in the end-product. However, as user acceptance will remain the ultimate yardstick for any individual product on the illicit market, a reputation for selling 'bad stuff' would not be conducive to good business on the part of the drug dealers.

B) A compartmentalization of illicit synthetic drug laboratory operations into the different stages along the manufacturing process, aimed at spreading the risk. This includes:

- the acquisition of precursor chemicals, illicit synthesis, and any further manipulation of the drug substance such as tableting being carried out separately and in different locations;
- the various stages of illicit synthesis itself being broken up into separate activities;
- an increasing number of clandestine chemists operating on a more independent, 'order and cash' basis when offering their skills.

C) An increased level of 'borrowing' concepts and adopting practices of the pharmaceutical and chemical industries, including for example:

- the maintenance of clandestine 'research' laboratories to develop new designer drugs; and
- the manufacture of so-called prodrugs, or metabolic precursors, of established (and usually regulated) drugs of abuse.

trafficking. On the manufacturing side, they may include, for example, the focus and level of law enforcement and regulatory activities, the skills of clandestine chemists and the level of sophistication of their laboratories. On the trafficking side, they include, importantly, the 'marketing' issue, i.e., the ability of clandestine operators to 'market' their products (Boxes G and H).

**CLANDESTINE SYNTHETIC DRUGS AND LINKS WITH ORGANIZED CRIME**

One of the worrying developments in the recent history of clandestine synthetic drugs is that their production and distribution are increasingly becoming structured, and integrated into international organized criminal activities. Driven by high profits, a clandestine synthetic drug 'industry' characterized by large-scale manufacture and international distribution networks is evolving.

'Market opportunities' are also likely to lead to a surge of polydrug trafficking and distribution, mirroring the polydrug abuse phenomenon. Intelligence information in several western European countries also suggests that criminals who have been involved in violent crime and the importation of traditional drugs are getting increasingly involved in the production and distribution of synthetic drugs. Some criminal 'investors' from western Europe exploit the economic and employment situation in eastern Europe. They invest the necessary capital, deliver the precursor chemicals for manufacturing ATS, take orders for markets abroad and launder profits through front companies. With large amounts of ready cash at their disposal, there is also a risk that criminal organizations may even purchase formerly state-owned and fully equipped premises for large-scale clandestine synthetic drug manufacture. There are also indications that criminal organizations are starting to control retail level distribution of synthetic drugs by taking over the

**BOX H: 'Product design' and 'marketing concepts'**

Since the recreational synthetic drug market is flexible and driven to a large extent by fashion, marketing concepts are of great importance. Based on the rather scattered evidence available, it can be expected that future clandestine chemists will be even more sensitive to the perceptions and needs of their clients, for example, by exploiting the closeness in appearance to legitimate products. To this end, they will continue to promote the tablet as a dosage form, and avoid the marketing of powders or liquids which need to be smoked, snorted or injected, and which lack the convenience and more benign image of 'pills'. Some law enforcement authorities also expect that in the future, in addition to the instructions on 'proper' use available on the Internet, some kind of written 'customer information' may be provided together with the drug.

Increasingly, 'new' drugs on the street are actually preexisting drugs with new names and alternative marketing. This usually involves taking an existing synthetic drug of low quality and simply modifying its appearance (colour and/or texture). A well-known example is 'ice', a particularly pure form of d-methamphetamine hydrochloride suitable for smoking. Adding food colouring is another simple marketing gimmick used in an attempt to differentiate various substances or to suggest to consumers a certain composition and quality of a given product. Moreover, combinations of drugs may be given a new name or may be marketed as a cocktail of drugs.

establishments where large dance parties are held, and where these drugs are sold.

From a historical perspective, the expansion of criminal groups engaged in the production and trafficking of plant-based drugs into synthetic drugs appears to have frequently started with trafficking in precursor chemicals, an activity which, unlike the distribution of the synthetic end-products, has always been international and multi-stage in character. Similarities to trafficking patterns of plant-based drugs have suggested for a long time that the same groups might be involved in both activities, and that the two markets are actually linked<sup>[9]</sup>. The next step, which is now underway in several parts of the world, is the move into the distribution of synthetic end-products. It is now generally acknowledged that, in some regions, the illicit activities in plant-based and synthetic drugs are already intertwined. In North America for example, criminal groups, once primarily involved in the trafficking of cannabis and cocaine from Mexico, seem to be using their existing distribution networks to supply the US market with methamphetamine, thus enabling a more rapid spread of methamphetamine throughout the country. According to some reports, Mexican drug trafficking groups are increasingly involved in illicit trafficking in 'ecstasy', exchanging cocaine from Latin America for 'ecstasy' manufactured in Europe<sup>[10]</sup>. A similar development can also be seen with heroin networks in East and South-East Asia, with the appearance of links between illicit activities in heroin and ATS, both at the manufacturing and trafficking levels: heroin and ATS may be increasingly manufactured in the same laboratories and distributed through the same distribution channels.

**CONCLUSIONS AND FUTURE OPTIONS**

This paper has attempted to give an overview of the synthetic drug phenomenon, its evolution, and likely future developments. While a number of conclusions emerge directly from the body of the paper itself, and are not summarized here in detail, this section highlights some major linkages between the peculiarities of clandestine manufacture, trafficking and abuse of synthetic drugs, and policy responses, other approaches and options for future consideration.

*Understanding the phenomenon*

While for decades the drug phenomenon was equated with the classical drugs of abuse, notably heroin and cocaine, there is now a new challenge in the form of synthetic drugs. This latest drug phenomenon is characterized by the recreational use of a number of synthetic psychoactive substances by a socially-integrated, mostly young, consumer population. Commonly held views about the harmlessness of those substances, and about their 'value' in helping to manage one's life more easily, or to experience pleasure and amusement in a controllable way without impacting on work performance, have contributed to their global spread, as has their association with technological advancements, modernism, and affluence. Economic models and societal norms and values emphasizing performance and individual success explain current pharmacological preferences and the attractiveness of substances which can be used to increase performance, to enhance or alter sensory perception and/or to facilitate inter-personal communication and social interaction.

Globalization and the emergence of performance-oriented societies in an increasing number of countries around the world seem to be drawing a growing number

of people, particularly the young, to seek comfort and pleasure in synthetic drugs. This trend may be accelerated by a supply 'push' inasmuch as clandestine manufacturers may explore the area of synthetic drugs further once they have recognized the potential inherent in the market: products can be tailor-made to satisfy consumer needs, and changes in fashion and consumer preferences can be responded to quickly. Considering the specificities of demand and supply of synthetic drugs together, there is thus good reason to anticipate an expansion of the synthetic drug phenomenon beyond the confines of certain sub-cultural or social groups to wider sections of society and to geographical areas where manufacture, trafficking and/or consumption have been hitherto unknown. Modern communication technology such as the Internet plays a critical role in this development by linking the world in terms of preferences and consumption patterns, and by rapidly and globally disseminating information on synthetic drugs and recipes for their manufacture. The potential therefore exists for synthetic drugs, in particular ATS, to become one of the major global concerns for drug control in the twenty-first century. Growing pressure to eliminate or significantly reduce coca and opium poppy cultivation<sup>[11]</sup> may also contribute to this development.

#### *Reducing demand*

Largely driven by demand and subject to clandestine experimentation and 'research', the new synthetic drug market is a flexible area. Mechanisms to obtain relevant and reliable information on emerging drugs and patterns of use in a timely manner are crucial for health and regulatory authorities alike, to ensure, for example, rapid dissemination of information on potential hazards related to the use of a new drug, or to design appropriate prevention and control strategies. Success may depend upon early warning mechanisms and the rapid and global dissemination of information gathered on new drugs, drug combinations, or patterns of use. In view of the widespread availability of certain synthetic drugs and the integration of their use in mainstream youth culture and leisure-time activities, prevention programmes tailored to specificities of the phenomenon (young age of consumer population, perceived harmlessness, etc.) and integrated into the wider concept of health promotion, can be considered key elements in any approach or strategy to reduce demand for clandestine synthetic drugs over the longer term.

#### *Reducing supply*

Measures to reduce supply need to address both the emergence of new synthetic drugs and the continued widespread availability of already banned substances. They also need to build on existing successes in the area of precursor control. Consequently, effective supply reduction strategies have to combine a broadening of the scope and flexibility of control systems with the

harmonization of national legislation and the strengthening of law enforcement activities in the area of illicit manufacture, trafficking and distribution of synthetic drugs.

#### *Improving the knowledge base*

In order to tackle an area as dynamic as the synthetic drug market in a comprehensive and pro-active manner on both the demand and the supply sides, a better understanding of the factors driving its evolution is required. Systematic investigations of the way that attitudes and perspectives of youth are affected by rapid social and economic changes and more detailed examinations of the complex interplay between demand and supply of individual synthetic drugs or drug classes, and how they relate to different geographical and cultural contexts are needed. Driving forces on the supply side will be better understood once the question of the impact of progress in science on the emergence of new synthetic drugs has been investigated. However, in view of the epidemic and global dimensions of synthetic drug use by young people, more systematic research into the (long-term) health consequences of synthetic drug use will be one of the most important and challenging areas of future work. This will allow for drawing together the diverging perceptions of synthetic drug use being seen as a blessing for some and a curse for others.

The findings from such investigations could contribute to improving the design of health education and prevention programmes as well as treatment services which meet the needs of (recreational) synthetic drug users. But such findings are also crucial for an assessment of the wider health and social implications of specific consumption patterns of synthetic drugs, now and particularly for the future. While research on ecstasy, for example, has for some time suggested cognitive, behavioural and emotional alterations in users, and suggestive evidence of human neurotoxicity has emerged during the past decade, it was only recently that the dose-dependent (cumulative) nature of the neuro-psychological deficits was confirmed in a larger sample of ecstasy users<sup>[12]</sup>. Since the current status of knowledge does not exclude possible long-term consequences on cognitive functioning, it is thus only further systematic and unbiased research that can help to answer one of the most worrying questions, namely whether current consumption patterns of certain synthetic drugs by young people will precipitate or exacerbate neurological problems, and whether we should expect that a whole generation of elderly, former synthetic drug users will in future suffer from a decline in mental functioning, much earlier or more pronounced than that associated with the normal ageing process.

*Developing a global response*

Over the past few years, growing international concern about rapidly increasing and widespread use of amphetamines has prompted the international community to call for a thorough global review of synthetic stimulants and their precursors<sup>[13]</sup>. A number of policy options for counter-measures and practical solutions have been developed. They include regional initiatives such as the 'Joint Action on New Synthetic Drugs' of the European Union<sup>[14]</sup>, which provides for the establishment of an early warning system to identify new synthetic drugs as they appear on the European market, for a mechanism to assess the risks of these drugs, and for a procedure to bring specific new synthetic drugs under control in EU Member States. At the international level, an Action Plan Against Illicit Manufacture, Trafficking and Abuse of Amphetamine-type Stimulants and their Precursors, including a time-frame for the establishment of national legislation and programmes, was adopted at the Special Session of the General Assembly (UNGASS) in June 1998. The action plan covers key areas of raising awareness and providing accurate information, reducing

demand, limiting supply, and strengthening control systems, and proposes countermeasures at all levels. Concrete steps are being developed for a coordinated effort to implement the action plan in the Far East, one of the regions most affected by the ATS problem.

On a global basis, a number of high level international meetings<sup>[15]</sup> have addressed the synthetic drug problem in all its dimensions, including regulatory action in precursor control, activities in the area of demand reduction and primary prevention, and improved operational capabilities of law enforcement authorities. Most recently, G8 experts have agreed on the need to tackle the synthetic drug problem at a global level, and in particular have re-emphasized the need for enhanced cooperation, at all levels, and for better and faster means for information collection and exchange.<sup>[16]</sup>

Full implementation of the UNGASS Action Plan on ATS will provide the necessary experience and an appropriate basis for tackling the problem of clandestine synthetic drugs in general.

ENDNOTES

1. Summarized from UNDCP, *Amphetamine-type Stimulants: A Global Review* (UNDCP/TS.3, Vienna, 1996). This study was the result of the first comprehensive analysis of the issue of ATS, including two expert group meetings in Vienna, Austria, in February 1996, and Shanghai, China PDR, in November 1996.
2. Hando, J. and Hall, W. (1997), Patterns of Amphetamine Use in Australia, in: *Amphetamine Misuse: International Perspectives on Current Trends* (H. Klee, ed.), Harwood Academic Publishers, The Netherlands.
3. Economic and Social Council (ECOSOC) (1998), *Youth and Drugs: A Global Overview*, United Nations (E/CN.7/1998/8).
4. Schuster, P., et al., Is the use of ecstasy and hallucinogens increasing?, *European Addiction Research*, 4, pp. 75-82, 1998.
5. International Narcotics Control Board (INCB), *Report 2000*, United Nations, New York, 2001, para321.
6. Shulgin, A. and Shulgin, A. (1991), *PIHKAL, A Chemical Love Story*, Transform Press, Berkeley; Shulgin, A. and Shulgin, A., (1997), *TIHKAL, The Continuation*, Transform Press, Berkeley.
7. ICPO Interpol, *1999 Trends and Patterns of Illicit Drug Traffic*, prepared for 43rd Session of the Commission on Narcotic Drugs, Vienna, 6-15 March 2000.
8. ICPO Interpol, *Drug Alert*, 9/2000.
9. UNDCP, 1996, *op.cit.*.
10. INCB, 2001, *op.cit.*, para294.
11. *Political declaration and action plan on international cooperation on the eradication of illicit crops and on alternative development*, adopted at the Special Session of the General Assembly Devoted to Countering the World Drug Problem Together, 8-10 June 1998 (Resolution S-20/1).
12. Thomasius, R. (2000), *Ecstasy: eine Studie zu gesundheitlichen und psychosozialen Folgen des Missbrauchs*, Wissenschaftliche Verlagsgesellschaft mbH Stuttgart, 2000.
13. Economic and Social Council (ECOSOC) resolution 1995/20; Comprehensive reviews of the ATS phenomenon in recent years include (i) the study by UNDCP on 'Amphetamine-type Stimulants: A Global Review' (UNDCP/TS.3, 1996); (ii) a WHO Meeting and report on 'Amphetamines, MDMA and other Psychostimulants', November 1996; and (iii) a book edited by H.Klee on 'Amphetamine Misuse: International Perspectives on Current Trends', Harwood Academic Publishers, 1997.
14. 'Joint Action on New Synthetic Drugs' of the European Union (16 June 1997).
15. "Anti-Drug Conference, Tokyo, 2000", Japan, January 2000; 33rd ASEAN Ministerial Meeting, Bangkok, Thailand, July 2000; G8 Kyushu-Okinawa Summit Meeting, Japan, July 2000; International Congress "In pursuit of a drug-free ASEAN 2015, Sharing the vision, leading the change", Bangkok, Thailand, October 2000.
16. G8 Ad-hoc Meeting of Drug Experts, Miyazaki, Japan, December 2000.