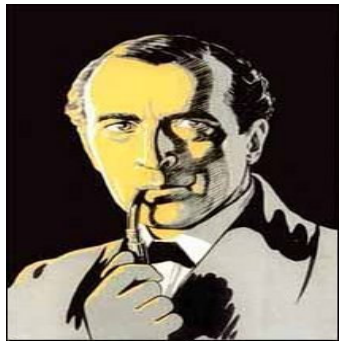
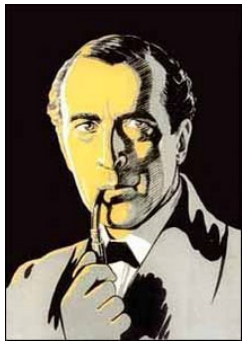
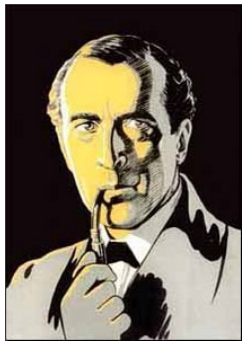


DRUGS



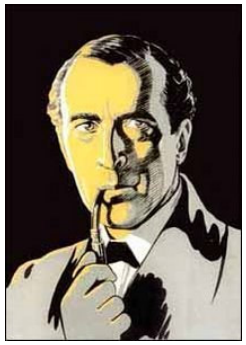
Introduction

- **A drug is defined as a natural or synthetic substance that is used to produce physiological or psychological effects in humans or other higher order animals.**
- ***Narcotic drugs are analgesics*, they relieve pain by a depressing action on the central nervous system. This effects functions such as blood pressure, pulse rate, and breathing rate.**
- **The regular use of a narcotic drug will *invariably* lead to physical dependence.**
- **The most common source for these narcotic drugs is *opium*, extracted from poppies**



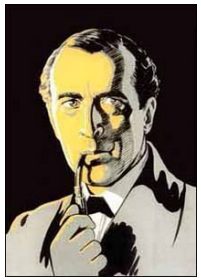
Opiates

- *Morphine* is extracted from opium and is used to synthesize heroin.
- Addicts frequently dissolve heroin in water by heating it in a spoon, and then inject in the skin.
- Heroin produces a “high” that is accompanied by drowsiness and a sense of well-being that generally last for three to four hours.
- *Codeine* is also present in opium, but it is usually prepared synthetically from morphine.



Hallucinogens

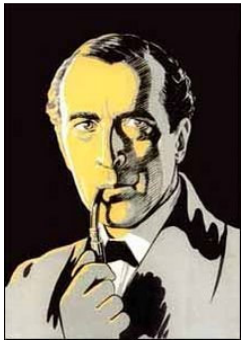
- *Marijuana* is the most well-known member of this class.
- Hallucinogens cause marked changes in normal thought processes, perceptions, and moods.
- Marijuana is the most controversial drug in this class because its long-term effects on health are still largely unknown.



Marijuana

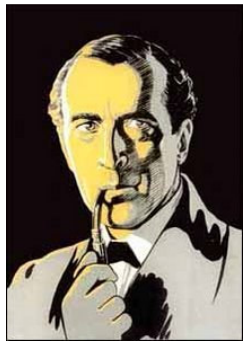
- Marijuana refers to a preparation derived from the plant ***Cannabis***.
- The chemical substance largely responsible for the hallucinogenic properties of marijuana is known as

  tetra-hydro-cannabinol, or THC.
- The THC content of ***Cannabis*** varies in different parts of the plant, generally decreasing in the following sequence: resin, flowers, leaves, with little THC in the stem, roots, or seeds.
- **The THC-rich resin is known as *Hashish*.**
- Marijuana does not cause physical dependency, but the risk of harm is in heavy, long-term use.



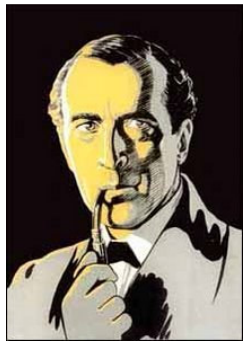
Other Hallucinogens

- Other hallucinogens include LSD, mescaline, PCP, psilocybin, and MDMA (Ecstasy).
- LSD is synthesized from lysergic acid, and can cause hallucinations that can last for 12 hours.
- Phencyclidine, or PCP, is often synthesized in clandestine laboratories and is often smoked, ingested, or sniffed.
- Phencyclidine is often mixed with other drugs, such as LSD, or amphetamine, and is sold as a powder ("angle dust") capsule, or tablet.
- Oral intake of PCP first leads to feelings of strength and invulnerability, which may turn to depression, tendencies toward violence, and suicide.



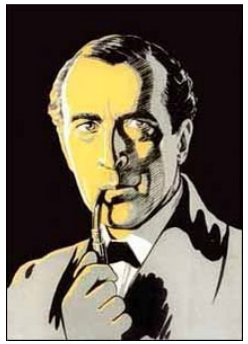
Depressants

- Depressants are another class of drugs.
- Depressants are substances used to depress the functions of the central nervous system.
- Depressants calm irritability and anxiety and may induce sleep.
- These include alcohol (ethanol), barbiturates, tranquilizers, and various substances that can be sniffed, such as airplane glue, model cement, or aerosol gas propellants such as freon.



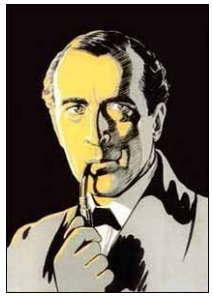
Depressants Continued

- Alcohol (ethyl alcohol) enters the body's bloodstream and quickly travels to the brain, where it acts to suppress the brain's control of thought processes and muscle coordination.
- Barbiturates, or "downers," are normally taken orally and create a feeling of well-being, relax the body, and produce sleep.
- Tranquilizers, unlike barbiturates, produce a relaxing tranquility without impairment of high-thinking faculties or inducing sleep.
- Sniffing has immediate effects such as exhilaration, but impairs judgment and may cause liver, heart, and brain damage or even death.



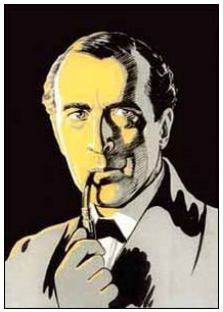
Stimulants

- Amphetamine and methamphetamine, often injected intravenously, cause an initial "rush," followed by an intense feeling of pleasure.
- This is followed by a period of exhaustion and a prolonged period of depression.
- Cocaine, extracted from the leaves of *Erythroxylin coca*, causes increased alertness and vigor, accompanied by the suppression of hunger, fatigue, and boredom.
- *Crack* is cocaine mixed with baking soda and water, then heated.
- *Crack* is often smoked in glass pipes, and, like cocaine, stimulates the brain's pleasure center.



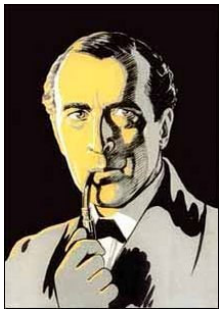
Club Drugs = Synthetic Drugs

- **The term *club drugs* refers to synthetic drugs that are used at nightclubs, bars, and raves (all-night dance parties).**
- **Substances that are often used as club drugs include, but are not limited to, MDMA (Ecstasy), GHB (gamma hydroxy butyrate), Rohypnol ("Roofies"), ketamine, and methamphetamine.**
- **GHB and Rohypnol are central nervous system depressants that are often connected with drug-facilitated sexual assault, rape, and robbery**



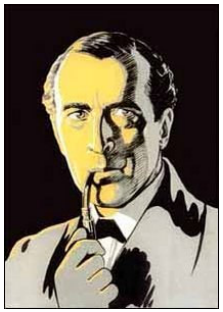
Club Drugs continued

- Methylenedioxymethamphetamine, also known as MDMA or Ecstasy, is a synthetic mind-altering drug that exhibits many hallucinogenic and amphetamine-like effects.
- Ecstasy enhances self-awareness and decreases inhibitions; however, seizures, muscle breakdown, stroke, kidney failure, and cardiovascular system failure often accompany chronic abuse.
- Ketamine is primarily used as a veterinary animal anesthetic that in humans causes euphoria and hallucinations.
- Ketamine can also cause impaired motor functions, high blood pressure, amnesia, and mild respiratory depression.



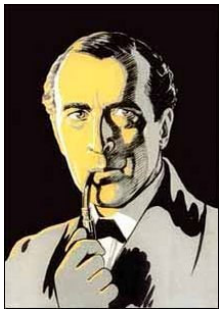
Anabolic Steroids

- These are yet another category of drugs
- These are synthetic compounds that are chemically related to the male sex hormone testosterone.
- These are often abused by individuals who are interested in accelerating muscle growth.
- Side effects include unpredictable effects on mood and personality, depression, diminished sex drive, halting bone growth, and liver cancer.



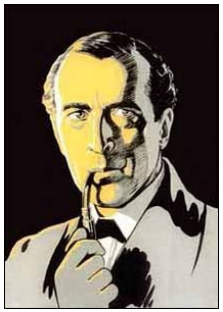
Drug-Control Laws

- **The U.S. federal law known as the Controlled Substances Act will serve to illustrate a legal drug-classification system created to prevent and control drug abuse.**
- **This federal law establishes five schedules of classification for controlled dangerous substances on the basis of a drug's:**
  - ***potential for abuse***
  - ***potential for physical and psychological dependence***
  - ***medical value***



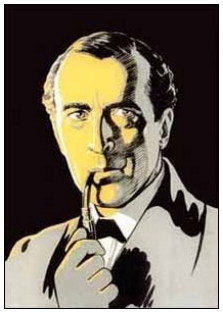
Schedules of Classification

- **Schedule I drugs have a high potential for abuse and have no currently accepted medical use such as heroin, marijuana, methaqualone and LSD.**
- **Schedule II drugs have a high potential for abuse and have medical use with severe restrictions such as cocaine, PCP, and most amphetamine and barbiturate prescriptions.**
- **Schedule III drugs have less potential for abuse and a currently accepted medical use such as all barbiturate prescriptions not covered under Schedule II, codeine, and anabolic steroids.**



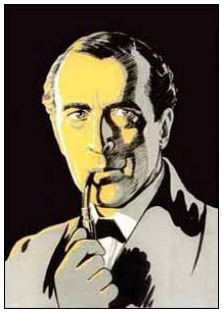
Schedules of Classification

- **Schedule IV drugs have a low potential for abuse and have a current medical use such as darvon, phenobarbital, and some tranquilizers such as diazepam (valium) and chlordiazepoxide (librium).**
- **Schedule V drugs must show low abuse potential and have medical use such as opiate drug mixtures that contain nonnarcotic medicinal ingredients.**



Drug Identification

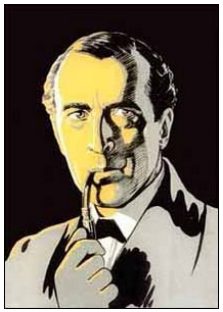
- **The challenge or difficulty of forensic drug identification comes in selecting analytical procedures that will ensure a specific identification of a drug.**
- **This plan, or scheme of analysis, is divided into two phases.**
  - **Screening test that is nonspecific and preliminary in nature to reduce the possibilities to a manageable number.**
  - **Confirmation test that is a single test that specifically identifies a substance.**



Identification Methods

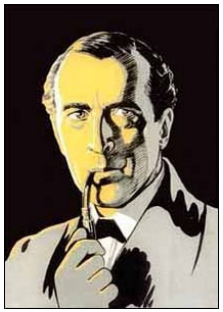
- ***1. Marquis*: 2% Foramldehyde in sulfuric acid**

  The reagent turns purple in the presence of heroine and morphine and most opium derivatives.
- ***2. Dillei-Koppanyi*: 1 % cobalt acetate in methanol is first added to suspect material, followed by 5% isopropylamine in methanol). This is a valuable screening test for barbiturates, in whose presence the reagent turns violet-blue in color**



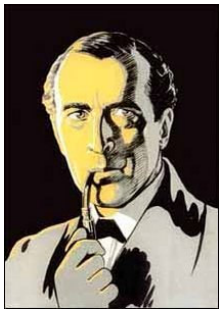
Identification Methods-contd.

- **3. *Duquenois-Levine* (Solution A is a mixture of 2 percent vanillin and one % aceta; dehydyde in ethly alcohol; solution B is concentrated by drochioric acid; solution B is concentrated hydrochropic acid; solution C is chloroform). This is a *valuable color test for Marjuana***



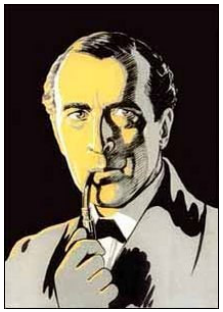
Preliminary Analysis

- Faced with the prospect that the unknown substance may be any one of a thousand or more commonly encountered drugs, the analyst must employ screening tests to reduce these possibilities to a small and manageable number.
- This objective is often accomplished by subjecting the material to a series of color tests that will produce characteristic colors for the more commonly encountered illicit drugs.
- Microcrystalline tests can also be used to identify specific drug substances by studying the size and shape of crystals formed when the drug is mixed with specific reagents.

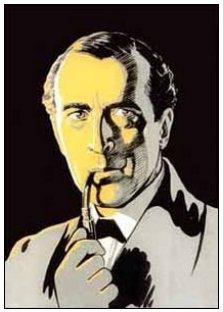


Confirmational Determination

- Once this preliminary analysis is completed, a confirmational determination is pursued.
- Forensic chemists will employ a specific test to identify a drug substance to the exclusion of all other known chemical substances.
- Typically infrared spectrophotometry or mass spectrometry is used to specifically identify a drug substance.

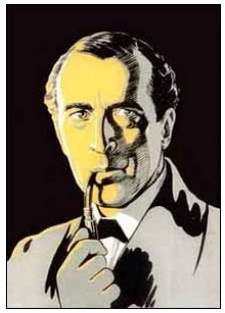


Infrared Spectrophotometer

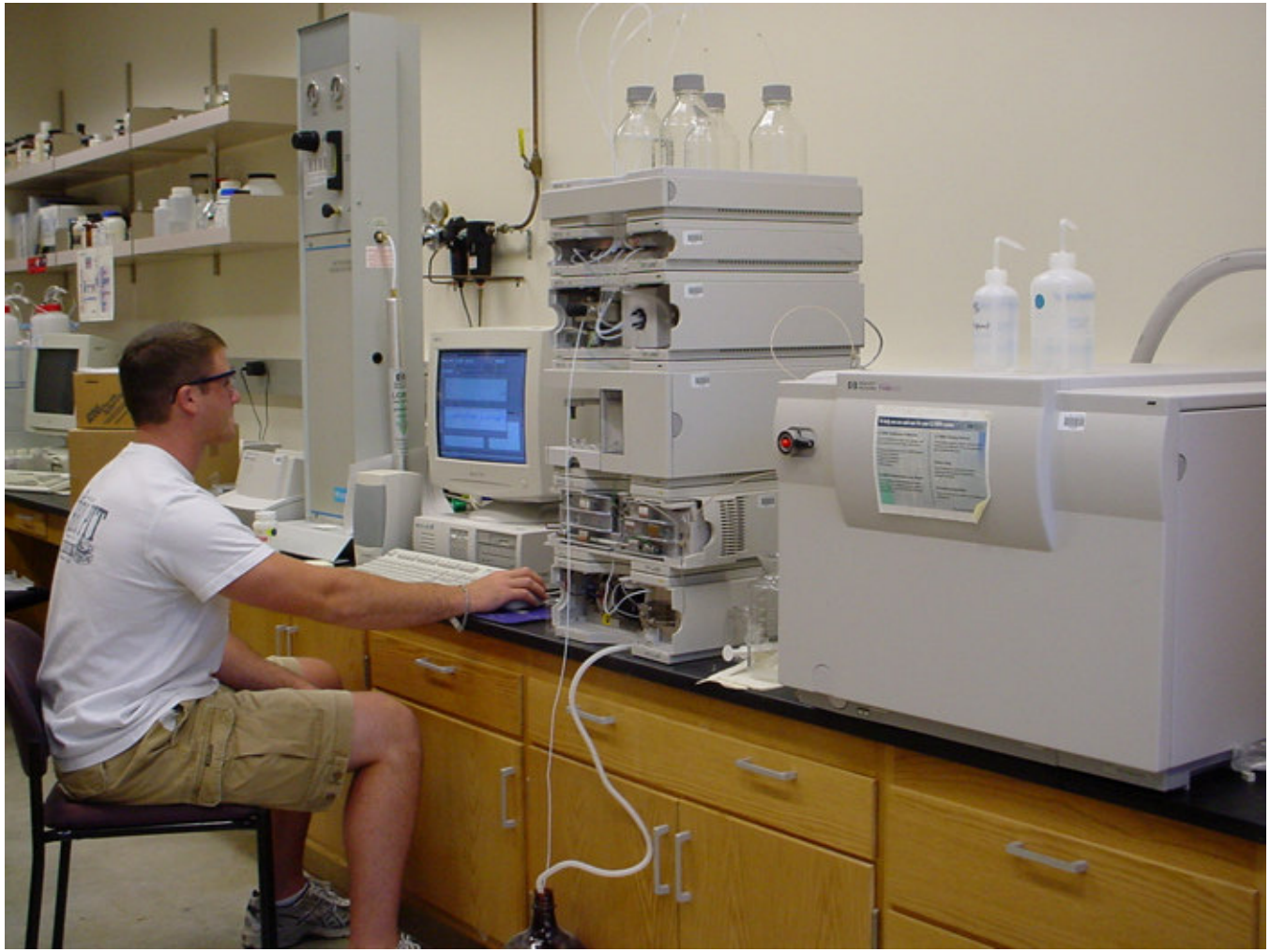


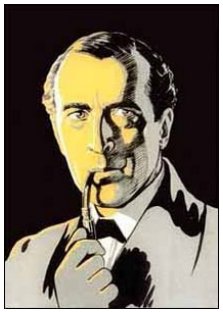
Spectrophotometer

- A spectrophotometer is a photometer (a device for measuring light intensity) that can measure intensity as a function of the color, or more specifically, the wavelength of light. There are many kinds of spectrophotometers.

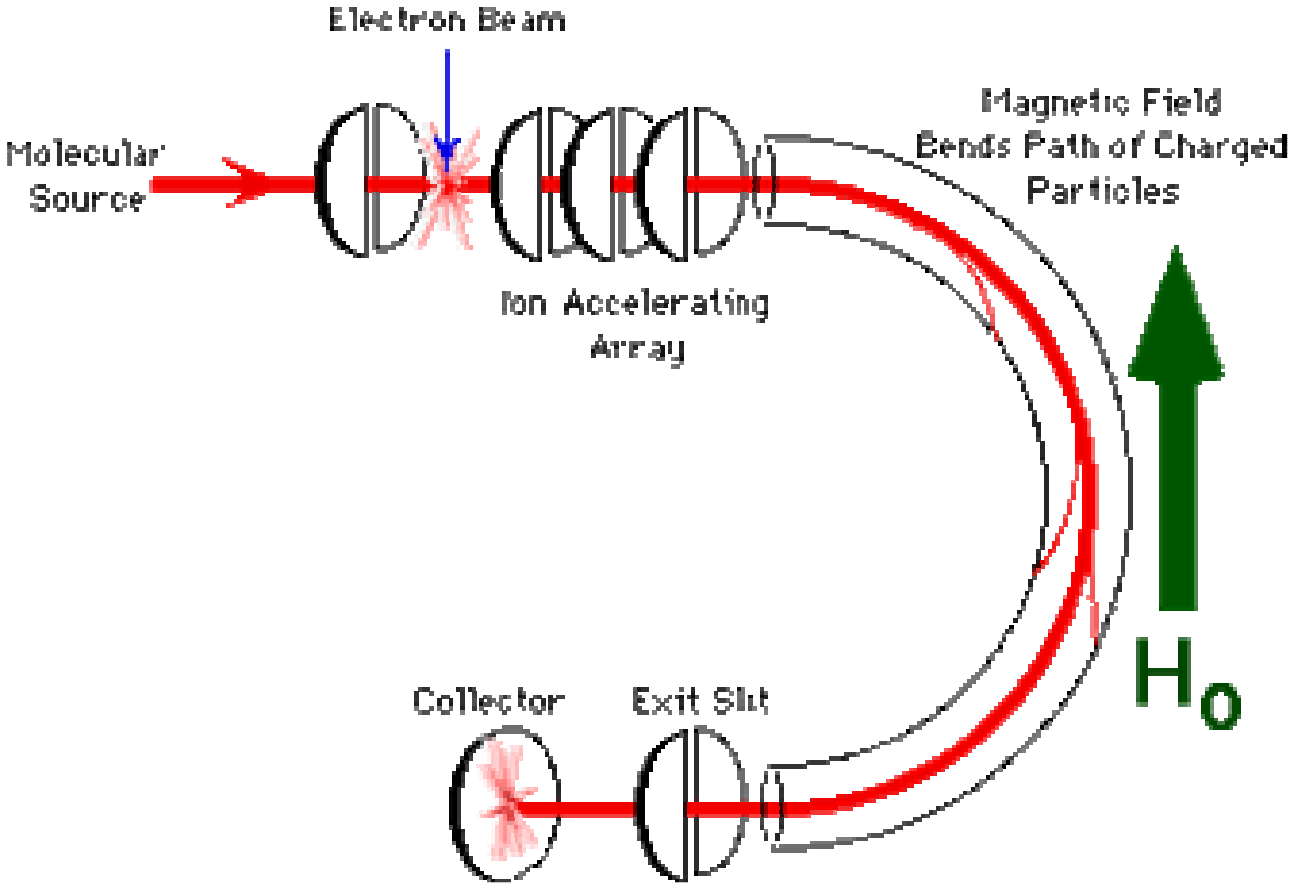


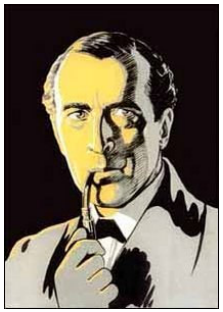
Mass Spectrometer





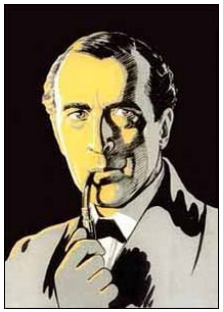
Mass Spectrometer





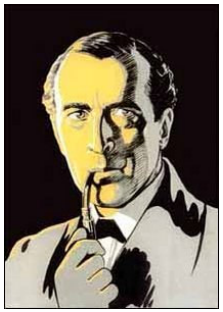
Mass Spectrometry

- In mass spectrometry, a substance is bombarded with an electron beam having sufficient energy to fragment the molecule.
- The positive fragments which are produced are accelerated in a vacuum through a magnetic field and are sorted on the basis of mass-to-charge ratio.
- Since the bulk of the ions produced in the mass spectrometer carry a unit positive charge, the value m/e is equivalent to the molecular weight of the fragment. The analysis of mass spectroscopy information involves the re-assembling of fragments, working backwards to generate the original molecule.



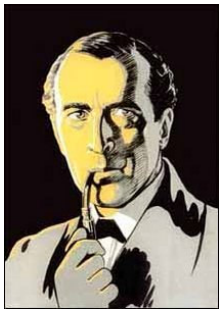
Collection and Preservation

- **The field investigator has the responsibility of ensuring that the evidence is properly packaged and labeled for the laboratory.**



Collection and Preservation Contd 2

- Generally common sense is the best guide, keeping in mind that the package must prevent the loss of the contents and/or cross-contamination.
- Often the original container in which the drug was seized will suffice.



Collection and Preservation Contd 3

- **All packages must be marked with information that is sufficient to ensure identification by the officer in the future and establish the chain of custody.**