

Tools and Techniques in Forensic Science

Measurements

Microscopy

Photography

Invisible Ray

Chromatography

Electrophoresis

Spectrography

Laser Microprobe

Mass Spectrometry

Spectrophotometry

Neutron Activation Analysis

X-ray Diffraction Analysis

TGA, DTA , NMR and Polarography

Scanning Electron Microscopy

Examination of Clue Materials Dimensions

Length, Breadth, Height, Depth,
Curvature and Diameter



Scale



Elbow Ruler



Calipers



Stopwatch



Thermometer



Ruler



Roll Meter



Micrometer

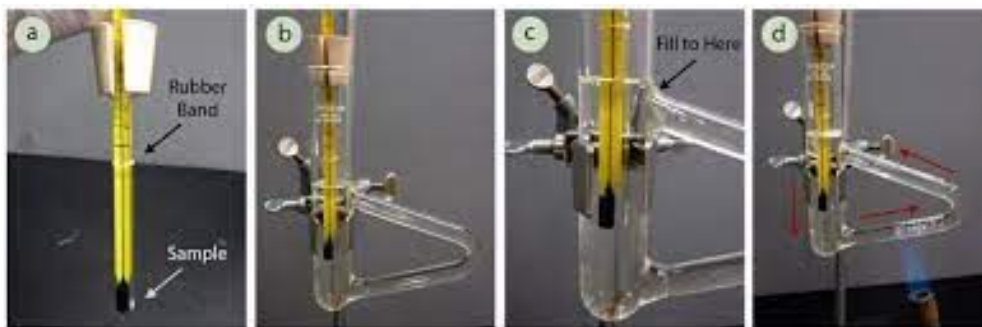


Beaker Glass



Angle Ruler

Melting point
Boiling Point
Densities
Refractive Indices
Birifrenes
Fluorescence



Microscopy

Compounds Microscope

Stereo Microscope

Comparison Microscope

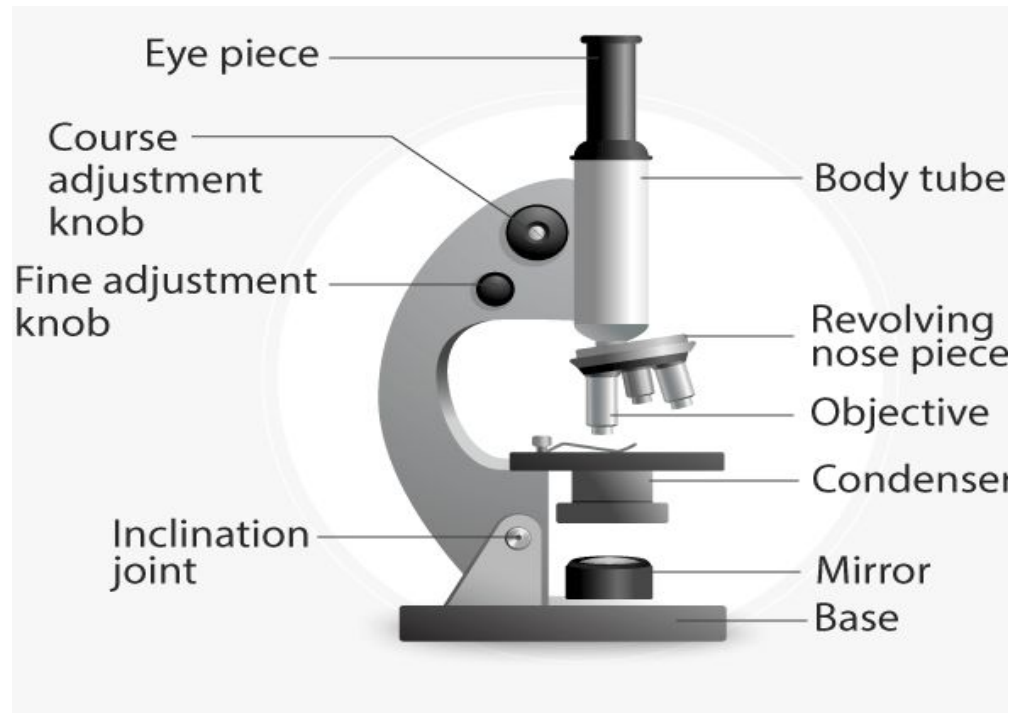
Phase contrast Microscope

Metallurgical Microscope

Fluorescence Microscope

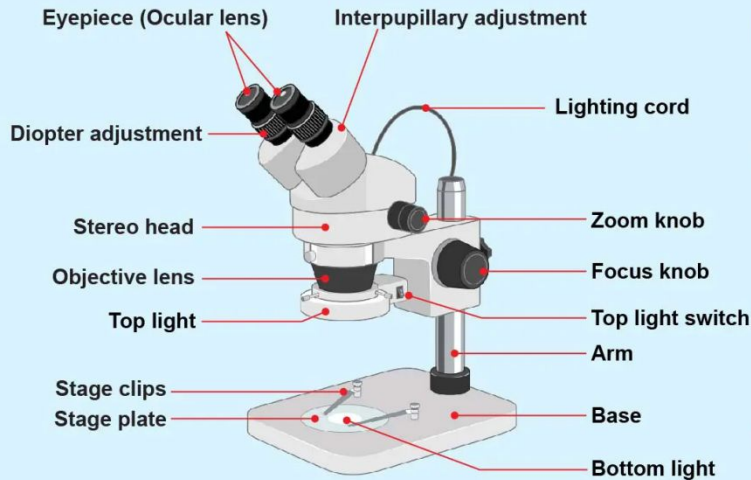
IR Microscope

Electron Microscopy Microscope



Stereo Microscope Parts

- labeled diagram and their functions -



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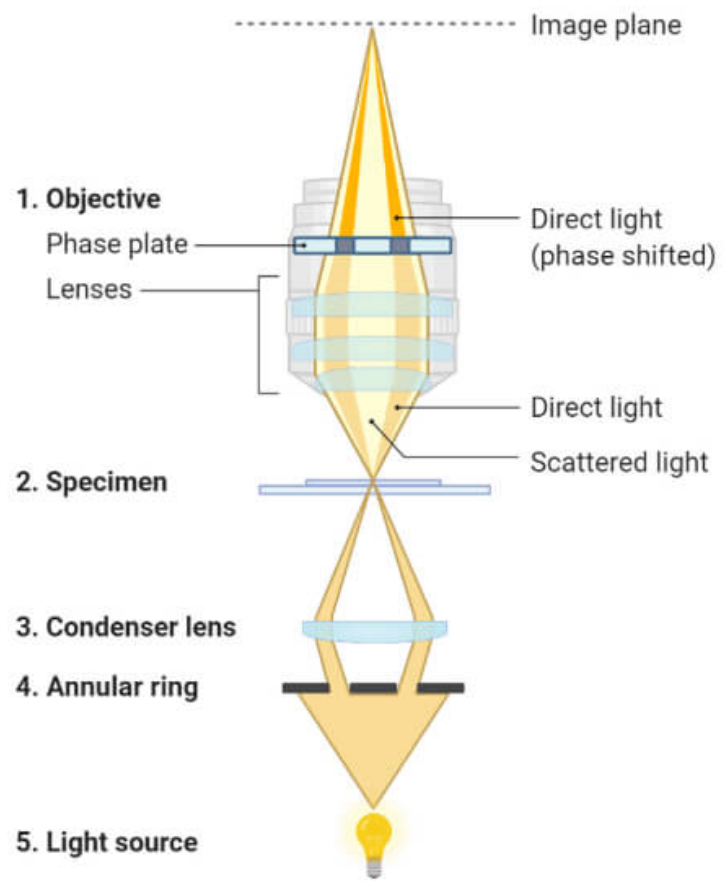
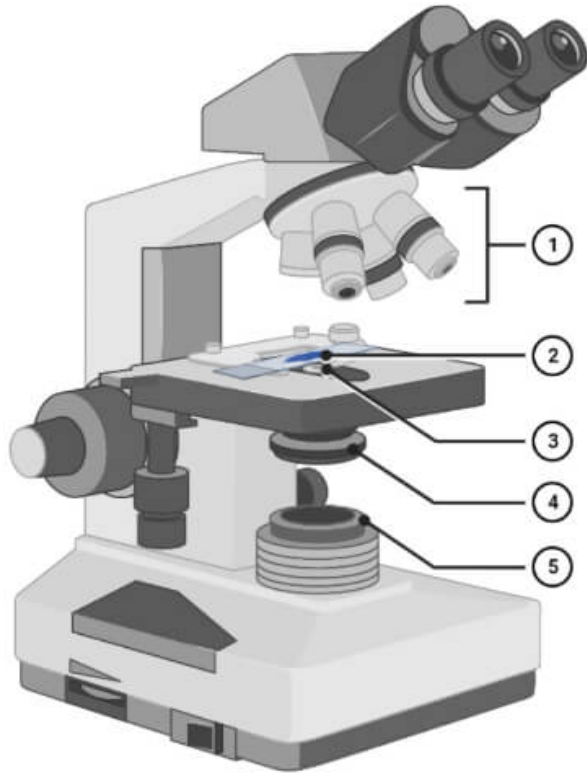


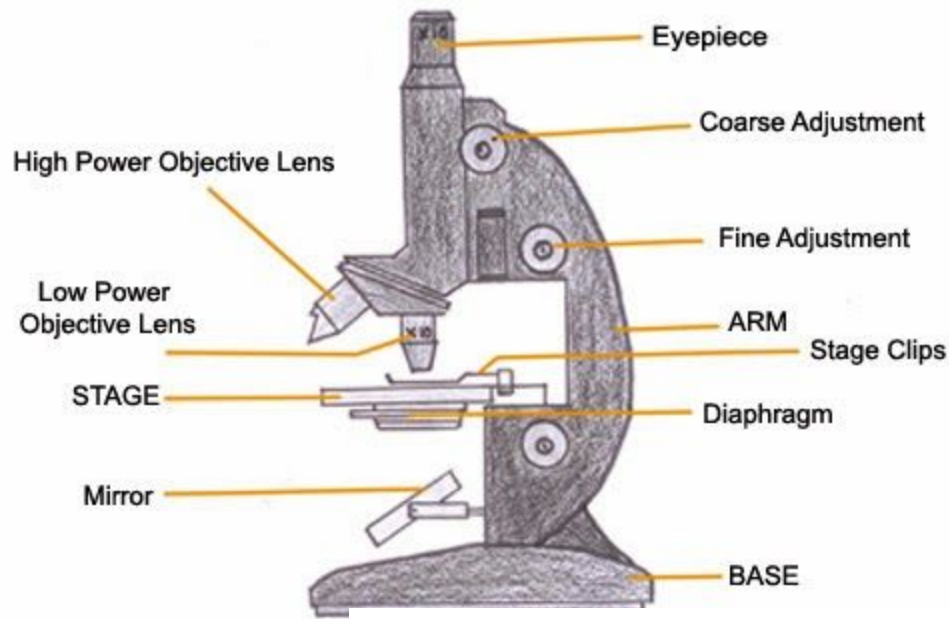
Comparison Microscope

- Consists of two compound microscopes mounted side by side
- Allows two pieces of evidence to be compared side by side.
- Evidence from crime scenes can be matched to suspects.
- Can be used to match bullets, hairs, fibers, etc.

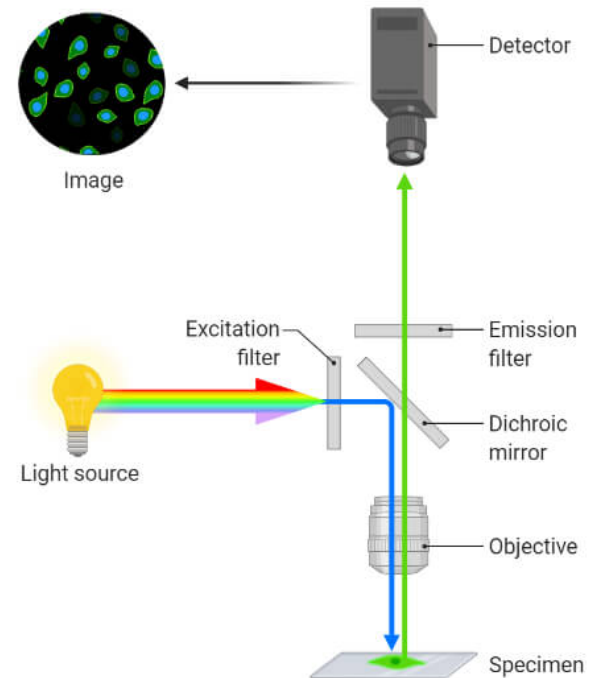


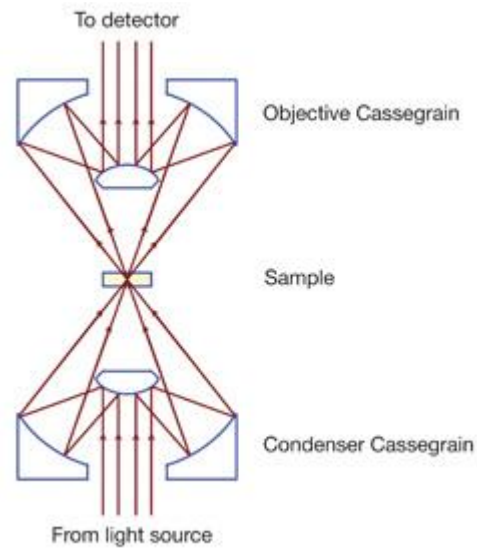
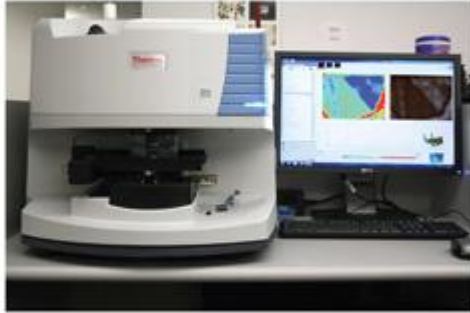
Phase Contrast Microscopy



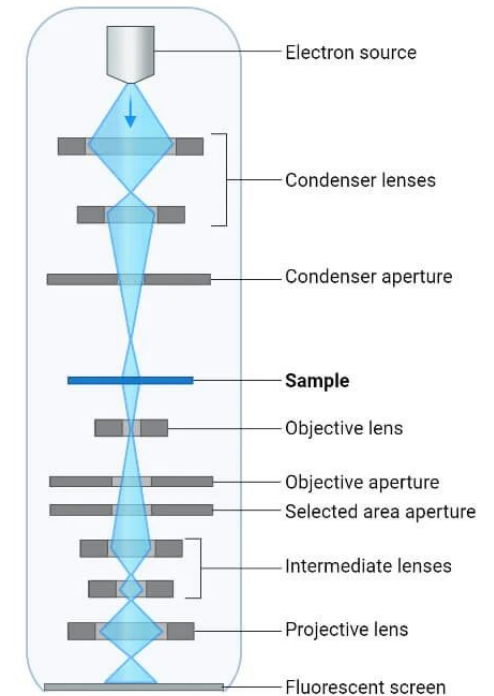
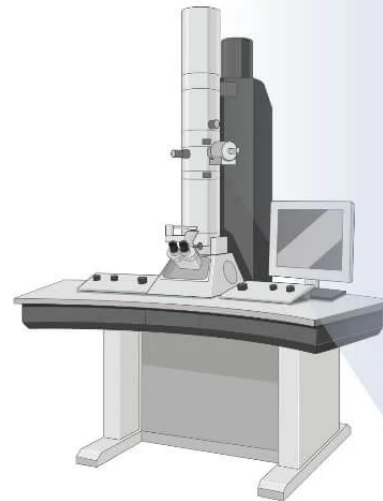


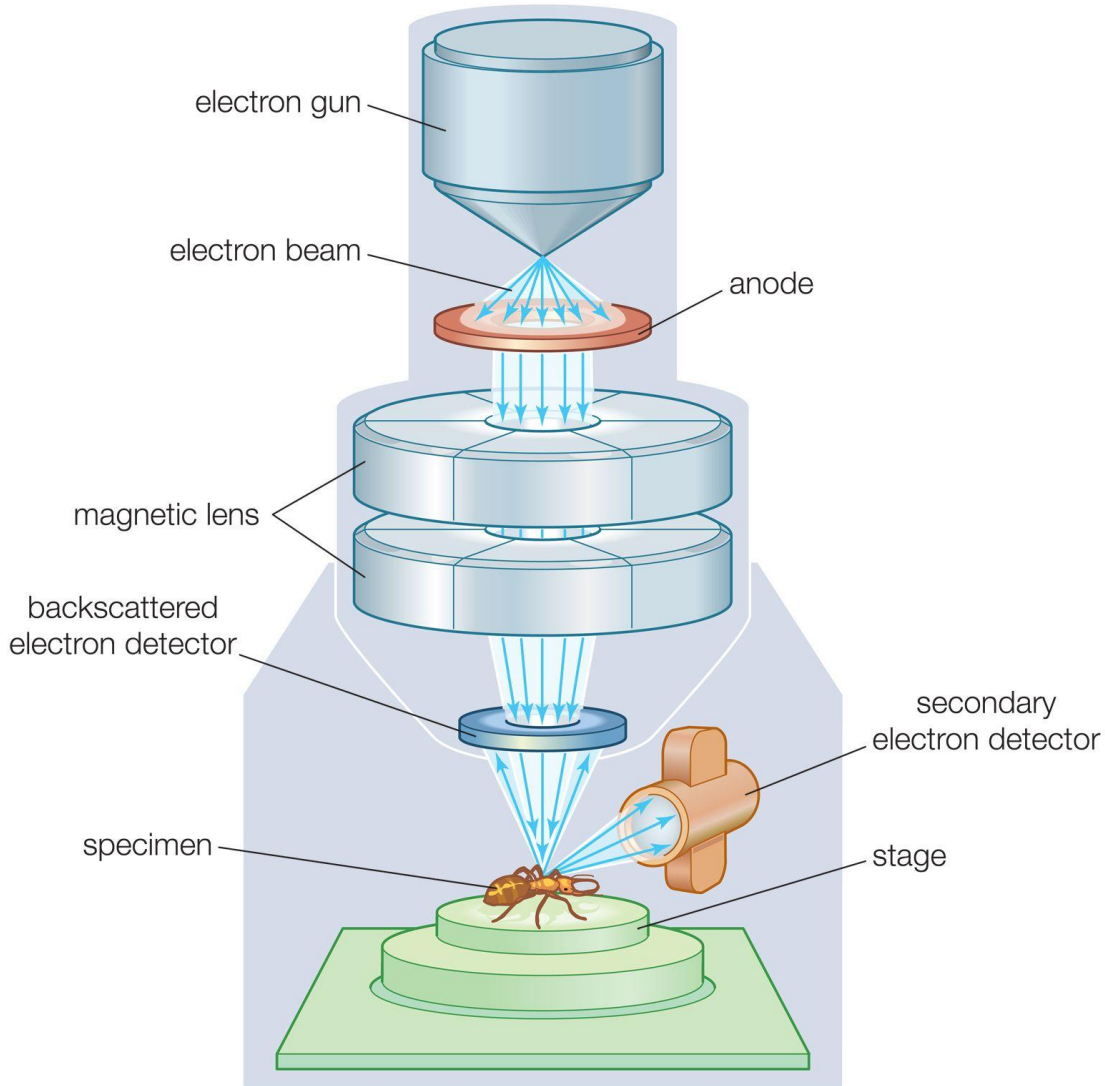
Fluorescence Microscopy





Transmission Electron Microscopy (TEM)





Photography

Investigating Officer and justice systems are well familiar with Photography

Useful for invisible trace, Visually unre

Chromatography

It assumed an great importance in Forensic Science

Column Chromatography Thin Layer Chromatography

High Performance Liquid Chromatography (HPLC)

Gas Chromatography (GC)

Forensic Science an International Perspective

Events in the last two decades have changed the face of the world.

There are far fewer restrictions on travel to and from countries around the world, modern communications are changing the way people do business, allowing trade to be conducted easily across time zones and when one financial market suffers the effect is felt globally.

Science generally has always been accepted as an international language and there is no reason why forensic science should be treated any differently.

Whereas ordinary people around the world may be somewhat reluctant to view their role within society from a global perspective, we know that for many criminals national boundaries are no barrier.

Law enforcement agencies have had to become much more active on the international scene taking part in increasing numbers of joint exercises with agencies from other countries, exchanging intelligence information and reviewing how law enforcement must change to deal effectively with international crime.

Equally important is the sharing of good practice and experience as the need for universal standards becomes more recognized.

Criminal trends, social pressures and political priorities all have implications for the investigation of crime. It is now accepted internationally that forensic science has an important role to play in the investigation of crime, from the crime scene to the court room.

Forensic science is committed to producing products and services which are fit for the purpose and to investing in staff to ensure that their competence and training continue to grow and keep pace with new developments in science, technology and the law.

Today, that investment must transcend national boundaries.

Forensic Science Around the World

Everything mentioned so far has implications for the administration of forensic science, especially from an international perspective, and the forensic science community has already begun to respond.

The American Society of Crime Laboratory Directors (ASCLD) and

Senior Managers Australian and New Zealand Forensic Laboratories (SMANZFL) and are similar managerially based organizations to

European Network of Forensic Science Institutes (ENFSI).



The American Society of Crime Laboratory Directors is a nonprofit society for forensic science. Membership is multinational, and is open to crime lab directors, managers or supervisors. ASCLD holds an annual members' conference, in which management training is given and networking is encouraged.

Founded: 1974



EUROPEAN NETWORK
OF FORENSIC SCIENCE
INSTITUTES

The European Network of Forensic Science Institutes was founded in 1995 in order to facilitate dialogue among the forensic science practitioners of Europe, as well as improving the quality of forensic science delivery. It has close cooperation with European police forces.

Purpose: Improving mutual exchange of information, and the quality of service delivery, in the field of Forensic Science

ASCLD, a professional organization of crime laboratory managers primarily supporting forensic laboratories in North America, believes in 'excellence through leadership in forensic science management'.

ASCLD's membership also extends to Directors of forensic laboratories around the world.

SMANZFL currently covers the forensic laboratories in Australia and New Zealand and aims to provide leadership in the pursuit of excellence within forensic science.

All three organizations, ENFSI, SMANZFL and ASCLD, actively support technical working groups charged with taking forward the business of forensic science at the technical/scientific level and increasingly these groups are communicating with one another.

Many countries already have their own forensic science societies/associations whose purpose is to support the needs of forensic scientists themselves, for example,

**the Forensic Science Society in the United Kingdom,
the Canadian Society of Forensic Sciences,
the American Academy of Forensic Science.**



Academia Iberoamericana de
Criminalística y Estudios Forenses
(AICEF)



The American Society of Crime
Laboratory Directors (ASCLD)



Asian Forensic Sciences Network
(AFSN)



European Network of Forensic
Science Institutes (ENFSI)



International Forensic Strategic
Alliance (IFSA)



Senior Managers of Australian and
New Zealand Forensic
Laboratories (SMANZFL)



Southern Africa Regional Forensic
Science (SARFS) Network

REGIONAL NETWORKS OF FORENSIC SCIENCE LABORATORIES



Read the pink highlighted topics just for information

The IAFS achieves these primarily by means of its principal activity which is the choice of President and venue for each triennial.

International association of Forensic science

The triennial meeting brings together colleagues from around the world and from all fields of expertise within forensic science in its broadest sense.

Crime Worldwide

The problems facing law-enforcement agencies, and by association forensic science, in Europe are no different from those faced by the rest of the world. All must be borne in mind when addressing how best to contribute to the solution.

Organized crime has always had something of an international perspective; the Colombian drug cartels, Sicilian and Italian Mafia and their American counterparts, the Chinese triads, Japanese yakuza and the Jamaican 'Yardies' are some of the more familiar organizations.

Now with the changes to the former USSR and Eastern Europe we are being introduced to groups about whom we know comparatively little.

Law enforcement agencies have established that these groups are active globally and are increasingly entering into business deals with each other.

There is evidence to suggest that organized crime has entered into business arrangements with terrorist groups, for example arranging the supply of arms or nuclear reagents in exchange for illicit drugs, supplies of which are readily available to some terrorist groups.

Aside from organized crime, the reduction in travel restrictions and the advances in modern communications have also resulted in an increase in serious cross-border crime.

Modern communications can allow individuals to commit offences such as fraud without travelling outside their own national boundaries.

The ease with which individuals can now travel abroad and the high throughput experienced by some destinations, particularly the major tourist attractions, creates additional problems for an investigation.

There are individuals who specifically travel abroad so that they might indulge in practices which are considered to be abhorrent by the majority of civilized societies and which have been criminalized in their own country.

There are still countries where culture may dictate an age that a **girl can marry**, and therefore engage in sexual relations, which is significantly younger than that which others may find acceptable. In other countries limited resources and other political priorities may prevent overstretched law-enforcement agencies from properly addressing such issues as child abuse.

As a result, this has provided opportunities for Western pedophiles to continue to practice in comparative safety from prosecution.

Campaigns by individuals and the United Nations have started to change the situation but, more importantly, hardening attitudes of some countries to citizens committing such crimes overseas has resulted in an unexpected response.

In some countries, legislation has already been enacted which potentially allows the authorities to prosecute a citizen for certain sexual offences against children which have been committed outside their national boundaries.

Changes in attitude such as these present major challenges for criminal investigations and justice systems around the world.

The forensic science community has already started to address the issues raised by these examples, what contribution it can make and what impact this will have on the administration of the science as a whole.

In support of this, international organizations have begun to acknowledge the important role forensic science can play.

Aside from the EU Police Cooperation Working Group, mentioned earlier, both Interpol and the United Nations have acknowledged the potential contribution of forensic science.

Interpol (the International Criminal Police Organization), which was established in 1914, is a worldwide organization (to date 195 member countries) whose aim is to promote and facilitate inquiries into criminal activities. Interpol has established working groups which focus on a number of fields of expertise within forensic science, bringing together scientists and law-enforcement officers to work in partnership.

The United Nations came into existence in 1945 and membership now stands at 196
185 States. The UN 'Family' includes bodies which focus on justice and human rights and the global drug problem and the involvement of organized crime.

In 1996, the Secretary-General on Human Rights produced a report on 'Human rights and forensic science' further reinforcing earlier work in 1992 which acknowledged the crucial role of forensic science in identifying probable victims of human rights violations and the collection of evidence for any subsequent legal proceedings.

The mission of the **United Nations International Drug Control Programme (UNDCP)** is to work with the nations of the world to tackle the global drug problem and its consequences. Two of the ways it intends to achieve this is by strengthening international action against drug production, trafficking and drug-related crime and by providing information, analysis and expertise on the drug issue.

Both of these will benefit from the involvement of forensic science. UNDCP has also acknowledged the importance of forensic science. In 1997/98 it contributed funding towards improving standards in the provision of forensic science in the Caribbean and establishing a center of excellence.

INTERPOL

INTERPOL is the world's largest international police organization,
with 190 member countries.

196



OFFICIAL NAME AND ABBREVIATIONS

The Organization's official name is "ICPO–INTERPOL" - 'International Criminal Police Organization'. The word "INTERPOL" is a contraction of "international police", and was chosen in 1946 as the telegraphic address.



Name and logo

The Organization's official name is "ICPO-INTERPOL".

The official abbreviation "ICPO" stands for 'International Criminal Police Organization'. In French this is "O.I.P.C.", which stands for "Organisation internationale de police criminelle".



INTERPOL

The emblem

The emblem, in use since 1950, comprises the following elements:

- A representation of the globe, to indicate that INTERPOL's activities are worldwide;
- Olive branches either side of the globe to symbolize peace;
- The name "INTERPOL" below the globe in the centre of the olive branches;
- A vertical sword behind the globe, symbolizing police action.
- The abbreviations "OIPC" and "ICPO" above the globe either side of the sword;
- The scales below the olive branches symbolize justice.

The flag

The flag has been in use since 1950.

- It has a light-blue background;
- The emblem is in the centre;
- The four lightning flashes arranged symmetrically around the emblem symbolize telecommunications and speed in police action.



A GLOBAL PRESENCE

The General Secretariat is located in Lyon, France, and operates 24 hours a day, 365 days a year. INTERPOL also has seven regional offices across the world and a representative office at the United Nations in New York and at the European Union in Brussels. Each of our 190 member countries maintains a National Central Bureau.



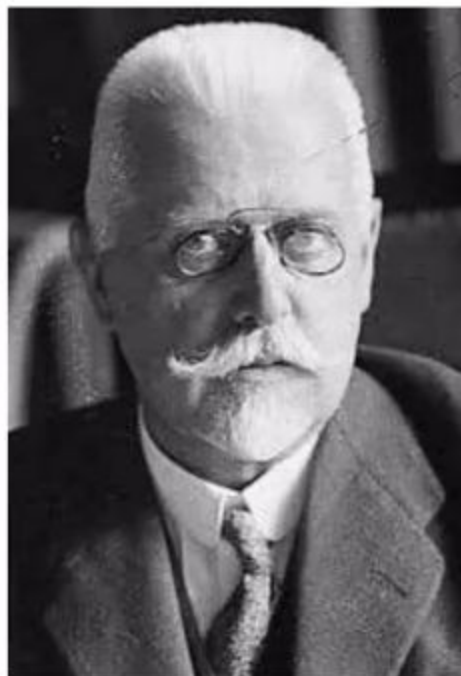
NEUTRALITY

At INTERPOL, we aim to facilitate international police cooperation even where diplomatic relations do not exist between particular countries. Action is taken within the limits of existing laws in different countries and in the spirit of the Universal Declaration of Human Rights. Our Constitution prohibits 'any intervention or activities of a political, military, religious or racial character'.



HISTORY

The idea of INTERPOL was born in 1914 at the first International Criminal Police Congress, held in Monaco. Officially created in 1923 **in Wien, in Austria, by the policechief Johannes Schober**, as the International Criminal Police Commission, the Organization became known as INTERPOL in 1956.



VISION AND MISSION

The **vision**:

"Connecting police for a safer world".

The **mission**:

"Preventing and fighting crime through enhanced cooperation and innovation on police and security matters".

PRIORITIES

INTERPOL's Strategic Framework sets the Organization's priorities and objectives for a given period of time (three years).

The Framework contains four strategic priorities and two corporate priorities.

These priorities are in line with the Organization's **vision and mission** and reflect the dynamic environment and challenges of international policing in the 21st century.



Strategic priorities

1. Secure global police information system
2. 24/7 support to policing and law enforcement
3. Innovation, capacity building and research
4. Assisting in the identification of crimes and criminals

Corporate priorities

1. Ensure organizational health and sustainability
2. Consolidate the institutional framework

Interpol INTERNATIONAL CRIMINAL POLICE ORGANISATION

The world's largest international police organization is INTERPOL.

History of Interpol: The idea of INTERPOL was born in 1914 at the first International Criminal Police Congress, held in Monaco.

Officially created in 1923 as the International Criminal Police Commission.

The Organization became known as INTERPOL in 1956.

In the beginning of century the core objective of European Criminal Police Units was to create an organization which would be able to coordinate various countries' law enforcement agencies' combat against crime on international level.

The Second International Criminal Police Congress held in 1923 in Vienna, Austria.

20 countries' representatives from all over the world attended to The Second International Criminal Police Congress.

They attended to lay the basis for creation of the International Criminal Police Commission.

The statute of the organization was adopted on the same day.

The head quarter was established in Vienna.

Dr. Johannes Schober became the First President of Vienna Police.

The first president of International Criminal Police Organization became the main initiator of establishing the organization.

The headquarters of International Criminal Police Organization moves to Berlin in 1938 after hijacking Austria by the Nazi Germany.

After World War II the organization renovated its functioning with headquarters in Paris.

International Criminal Police Organization was prohibited to intervene in any decision connected to military offences.

1956 is a year of great importance in Interpol history as on the 25th Session of International Criminal Police Commission the Organization's constitution, which is still valid today.

The Constitution of INTERPOL was unanimously adopted.

Under the Constitution the organization assumed the name of International Criminal Police Organization.

Later the provisions provided in the constitution enabled Interpol to be recognized as a reliable international intergovernmental organization.

It has 195 member countries.

Its headquarters, the General Secretariat, are located in Lyon, France.

In addition to a representative office at United Nations Headquarters in New York.

INTERPOL currently operates six Sub-regional bureaus staffed by law enforcement representatives originating from the region.

These bureaus are located in

Argentina, Ivory Coast, El Salvador, Kenya, Thailand and Zimbabwe with a seventh regional office is in Cameroun.

Each INTERPOL member country maintains a National Central Bureau, known as an NCB.

Now 195 countries are the members of INTERPOL

According to the constitution Interpol's aims are:

1. Facilitate international police co-operation within the limits of existing laws in different countries and in the spirit of the Universal Declaration of Human Rights.
2. Establish and develop institutions likely to contribute to the prevention and suppression of ordinary law crimes.

International Criminal Police Organization – Interpol has its firmly interconnected Functional structure comprising:

1. General Assembly.
2. Executive Committee.
3. General Secretariat.
4. National Central Bureaus.
5. Advisers.

National Central Bureaus perform an important role in ensuring a constant and active cooperation of Interpol member countries with one another and General Secretariat.

It has defined in Article 32 of the Constitution, “In order to ensure the co-operation, each country shall appoint a body which will serve as the National Central Bureau and shall ensure liaison with:

- a) The various departments in the country.
- b) Those bodies in other countries serving as National Central Bureaus.
- c) The Organization’s general Secretariat.

The mandate and the primary task of INTERPOL is to support police and law enforcement agencies in its 195 member countries in their efforts to prevent crime and conduct criminal investigations as efficiently and effectively as possible.

Specifically, INTERPOL facilitates cross border police cooperation and, as appropriate, supports governmental and intergovernmental organizations, authorities and services whose mission is to prevent or combat crime.

In order to carry out its mandate, INTERPOL provides its member countries and designated partner organizations four core functions or services:

1. Secure global police communications services.
2. Global databases and data services.
3. Operational police support services.
4. Training and Development.

INTERPOL recently designed and implemented a state-of-the-art global communications system for the law enforcement community. It is called “I-24/7”. This new communication tool – to which all member countries are already connected – allows for the transmission of information about suspected individuals and crimes to INTERPOL’s member countries requiring assistance with ongoing international investigations in a secure manner within real time.

Once police have the capability to communicate internationally, they need access to information which can assist investigations or help prevent crime.

INTERPOL has therefore developed and maintains a range of global databases and data services, covering key information such as names, **fingerprints, photographs, DNA profiles of individuals** under investigation or wanted for arrest as well as data concerning **Stolen 2 and Lost identification and Travel Documents (SLTD)**, stolen vehicles, stolen works of art and illicit weapons related to criminal cases.

INTERPOL has six priority crime areas:

1. drugs and organized crime,
2. financial and high-tech crime,
3. fugitives,
4. public safety and terrorism,
5. trafficking in human beings (including crimes against children),
6. corruption.

Other crime areas of concern include, inter alia, environmental and intellectual property crime.

In addition to specific crime area support, INTERPOL operates a **Command and Coordination Centre (“CCC”)** 24 hours a day/7 days a week, linking the General Secretariat, regional offices and all NCBs for urgent police-related matter or emergency.

The CCC co-ordinates the exchange of information between member countries requesting assistance with international investigations.

The CCC also assumes a crisis-management role during serious incidents and serves as the first point of contact for any member country which might require assistance with a crisis situation.

In addition, upon request of a member country, INTERPOL can deploy

Incidence Response Teams (IRT)

It has the capacity to provide a range of investigative and analytical support to the local law enforcement authorities at the scene of the incident.

INTERPOL enhances the capacity of member countries to effectively combat serious transnational crime and terrorism, through the provision of-

- (a) focused police training initiatives.
- (b) on-demand advice, guidance and support in building dedicated crime-fighting components with national police forces.

The latter includes the sharing of knowledge, skills and best practices in policing through INTERPOL channels and the establishment of global standards on how to combat specific forms of crimes.

One of greatest challenges facing law enforcement in ensuring border security.

Border security 3 requires highly coordinated and efficient international police cooperation, in particular the capacity and willingness to share crucial information. When processing persons entering a country, specific information is needed to identify suspected and wanted individuals and to enable border security authorities to make informed decisions and take appropriate action.

This includes accurate information on “wanted” persons as well as the ability to verify the authenticity of travel documents.

INTERPOL’s color-coded international Notices system informs member countries of the movements of known international criminals either subject to arrest and extradition or suspected of criminal involvement.

The most widely known is the Red Notice, an international request by an INTERPOL member country for the provisional arrest of an individual who has been charged with a crime by a judicial authority and based on the requesting country’s commitment to seek extradition.

In addition, INTERPOL in cooperation with the Security Council’s 1267 Committee created the INTERPOL-United Nations Security Council Special Notices.

The Special Notice can be especially effective in promoting enforcement of the travel ban as they are available to all of INTERPOL’s member countries through the Organization’s I-24/7 communications system.

The terrorists and other serious criminals often use false documents to travel.

In 2002 Interpol created and launched its database on Stolen and Lost Travel Documents (SLTD)

This database, which is also available to all of INTERPOL's member countries through the I-24/7 system.

In order to make reliable, accurate and up- to-date information available to front-line officers in real-time, INTERPOL has developed new integrated solutions to allow for direct access to INTERPOL's databases.

This new technology called FIND / MIND refers to the two different ways of connecting INTERPOL's databases at border entry points or other remote field locations.

To strengthen border protection, INTERPOL intends to establish a Border and Ports Security Center at its General Secretariat in Lyon, France.

The goal of the Center will be to increase security at borders and all points of entry by supporting member countries in the monitoring, prevention and investigation of fraudulent and illegal activities in these areas.

The specific objectives of this Center will be to monitor, analyze and report on the use of INTERPOL'S tools, such as the Stolen and Lost Travel Documents database, by member countries and to co-ordinate the delivery of training and other capacity-building measures that would help member countries comply with the present international security requirements for ports-of-entry.

Structure

General Assembly

The General Assembly is composed of delegates appointed by the governments of member countries. As INTERPOL's supreme governing body, it meets once a year and takes all the major decisions affecting general policy, the resources needed for international cooperation, working methods, finances and programmes of activities.

Executive Committee

The Executive Committee (EC) meets three times a year and sets organizational policy and direction.

Its role is to:

- Supervise the execution of the decisions of the General Assembly;
- Prepare the agenda for sessions of the General Assembly;
- Submit to the General Assembly any programme of work or project which it considers useful;
- Supervise the administration and work of the Secretary General.

Commission for the Control of INTERPOL's

Files (CCF) – The CCF ensures that the processing of personal data – such as names and fingerprints – is in line with INTERPOL's rules, in order to protect both the fundamental rights of individuals and the cooperation among police internationally.

General Secretariat

Located in Lyon, France, the General Secretariat operates 24 hours a day, 365 days a year.

Recognizing the value of bringing together police within a region to share experiences and tackle common crime issues, the Secretariat has seven regional offices:

- Argentina (Buenos Aires)
- Cameroon (Yaoundé)
- Côte d'Ivoire (Abidjan)
- El Salvador (San Salvador)
- Kenya (Nairobi)
- Thailand (Bangkok)
- Zimbabwe (Harare)

Constitution of Interpol

1. to ensure and promote the widest possible mutual assistance between all criminal police authorities within the limits of the laws existing in the different countries and in the spirit of the “UNIVERSAL DECLARATION OF HUMAN RIGHTS”.
2. to establish and develop all institutions likely to contribute effectively to the prevention and suppression of ordinary law crimes.

(Strictly forbidden activities to intervene by the organization)

POLITICAL, MILITARY, RELIGIOUS, Or Racial character

Membership any country may designate as a member to the Organization any official police body whose functions come within the framework of activities of the Organization

STRUCTURE AND ORGANIZATION The International Criminal Police Organization- Interpol shall comprise: The General Assembly Functions:

- a) to carry out the duties laid down in the constitution
- b) To determine principles and lay down the general measures suitable for attaining the objectives of the Organization as given in the constitution;
- c) To examine and approve the general programme of activities prepared by the secretary general for the coming year. d) To determine any other regulations deemed necessary; e) To elect persons to perform functions mentioned in the Constitution; f) To adopt resolutions and make recommendations to members on matters within which the Organization is competent to deal; g) To determine the financial policy of the Organization; h) To examine and approve any agreements to be made with other organizations.

The Executive Assembly Composed of; 1. One President 2. Three Vice-presidents 3. And nine delegates 4. Thirteen members coming from The General Secretariat The National Central Bureaus The Advisers The Commission for the Control of Files

Notices

INTERPOL Notices are international requests for cooperation or alerts allowing police in member countries to share critical crime-related information.

In addition, Notices are used by the United Nations, International Criminal Tribunals and the International Criminal Court to seek persons wanted for committing crimes within their jurisdiction, notably genocide, war crimes, and crimes against humanity.

Notices

- ▶ INTERPOL Notices are international requests for cooperation or alerts allowing police in member countries to share critical crime-related information.

Types of Notice



Red Notice

To seek the location and arrest of wanted persons with a view to extradition or similar lawful action



Blue Notice

To collect additional information about a person's identity, location or activities in relation to a crime.



Green Notice

To provide warnings and intelligence about persons who have committed criminal offences and are likely to repeat these crimes in other countries.



INTERPOL–United Nations Security Council Special Notice

Issued for groups and individuals who are the targets of UN Security Council Sanctions Committees.



Yellow Notice

To help locate missing persons, often minors, or to help identify persons who are unable to identify themselves.



Orange Notice

To warn of an event, a person, an object or a process representing a serious and imminent threat to public safety.



Black Notice

To seek information on unidentified bodies.



Purple Notice

To seek or provide information on modus operandi, objects, devices and concealment methods used by criminals.

INTERPOL has developed a set of seven Global Policing Goals

- ▶ Goal 1: Counter the threat of terrorism
- ▶ Goal 2: Promote border integrity worldwide
- ▶ Goal 3: Protect vulnerable communities
- ▶ Goal 4: Secure cyberspace for people and businesses
- ▶ Goal 5: Promote global integrity
- ▶ Goal 6: Curb illicit markets
- ▶ Goal 7: Support environmental security and sustainability

CRIME AREAS



**PHARMACEUTICAL
CRIME**



**ORGANIZED
CRIME**



**TRAFFICKING IN
ILLICIT
GOODS AND
COUNTERFEITING**



**WORKS
OF ART**



FIREARMS



**TRAFFICKING
IN HUMAN BEINGS**



CYBERCRIME



TERRORISM



CORRUPTION



**CRIMES AGAINST
CHILDREN**



DRUGS



**ENVIRONMENTAL
CRIME**



**FINANCIAL
CRIME**



**FUGITIVE
INVESTIGATION**



**MARITIME
PIRACY**



VEHICLE CRIME

These organizations provide forensic scientists the opportunity to make contacts and exchange technical information, experience and best practice through meetings, newsletters, journals and the Internet.

In addition to these there are the international organizations which bring the global community together; **Interpol** holds a triennial Forensic Science Symposium attended by both forensic scientists and law-enforcement officers.

The International Association of Forensic Science (IAFS) was formed in 1966.

It is unique in that it is an association in name only – it has no members, no budget and no permanent secretariat.

Its stated aims and objectives are:

1. To develop the forensic sciences;
2. To assist forensic scientists and others to exchange scientific and technical information; and,
3. To organize meetings.

What a forensic investigator do?

A forensic expert/scientist :

Collect

- Collection of evidence from crime scene

Preserve

- For future reference

Analyze/Examine

- To connect links and solve the crime



Services provided by forensic scientist

At the Crime scene

- *Recognizing and discovery of evidence*
- *Collection of evidence*
- *Packing of evidence*
- *Transportation of evidence to laboratory*

In the laboratory

- *Examination of evidence*
- *Safe custody of evidence*
- *Transportation of evidence to court*
- *Exhibiting evidence in court*

Forensic Scientist Skills and Education

- Although the job duties of forensic scientists will vary according to their discipline or specialty, they must possess similar skills, which include being able to adequately exhibit:
- Critical-thinking skills
- Problem-solving skills
- Verbal and written skills
- Deductive reasoning
- highly perceptive and detail-oriented
- able to spend extended periods conducting meticulous, often painstaking, work.



Forensic Document Examiner

- Forensic document expert examines the various types of documents directly or indirectly involved in a forgery case.
- The forgery cases may be of different types, but all these are examined by the handwriting expert.
- From the report of a document examiner, the investigating agency can definitely detect the real culprit of a particular case.
- Apart from the forged signatures or documents, a handwriting expert often gives opinion on typed papers, time of writing and the age of the ink used for writing a questionable documents.
- So the opinion of a handwriting expert also helps the court to a conclusion in meeting the ends of justice.

Forensic Toxicologist

- Forensic toxicologist determines the clues of the crime in which poison is used.
- In any such case, be it accidental suicidal or intentional, a toxicologist analyses the viscera and other relevant materials from which he establishes the quality and quantity of poison used.
- From the report of a toxicologist, the investigating officer can usually obtain vital clues for detecting the criminals involved.
- Similarly, the Court also gets positive evidence for coming to a conclusion in any particular case.

Forensic Serologist

- Forensic serologist has to ascertain whether the particular weapon (e.g knife) is stained with human blood or not.
- From the findings of a serologist, the investigating officer can get a definite clue in a particular case, depending on which the investigating officer can identify the culprit of the crime.
- It is the serologist who has to establish the facts of disputed paternity cases by testing the blood group in question.

Forensic Ballistic Expert

- A Forensic ballistic expert is the only person who ascertains whether a particular fire arm was used or not while committing a crime.
- He is also to examine the types of fire arms and ammunitions used in commission of a crime.
- He has to establish the facts with regard to firing ranges, distance, direction, and angle of firing.
- After obtaining the opinion of a ballistic expert the investigating officers can come to a reasonable conclusion in respect of a particular crime.
- Apart from the different fire arms and ammunitions a ballistic expert is also to examine the explosive substance which are nowadays very often used for committing heinous crimes.

Forensic Chemist

- Forensic chemistry performs qualitative and quantitative analysis of chemicals found on people, various objects, or in solutions.
- Chemists analyze drugs as well as paints, remnants of explosives, fire debris, gun shot residues, fibers, and soil samples.
- They can also test for a presence of radioactive substances (nuclear weapons), toxic chemicals (chemical weapons) and biological toxins (biological weapons).
- Forensic chemists can also be called on in a case of environmental pollution to test the compounds and trace their origin.
- Forensic chemist has to determine purity of petrol, diesel and kerosene from samples.
- They are also to determine the quality of liquor, opium, ganja and other chemicals, analysis of explosive and the like.
- From their various methods of analysis, they have to establish facts basing upon which the investigating officers can detect the clues of a particular crime.

DNA Evidence

- Most common samples obtained are blood, hair, saliva (from cigarette butts or chewing gum), skin, nails, teeth and semen.
- DNA is the main method of identifying people. DNA can be extracted from any of these samples and used for comparative analysis.
- Victims of crashes or fires are often unrecognizable, but adequate DNA can be isolated and a person can be positively identified if a sample of their DNA or their family's.
- Samples are processed to isolate the DNA and establish the origin of the samples. Samples must first be identified as **human, animal, or plant** before further investigation proceeds.
- For some applications, such as customs and quarantine, traces of animal and plant tissue have to be identified to the level of the species, as **transport of some species is prohibited**.
- A presence of a particular species can also prove that a suspect or victim visited a particular area.
- In cases of national security, samples are tested for the presence of pathogens and toxins, and the latter are also analyzed chemically.