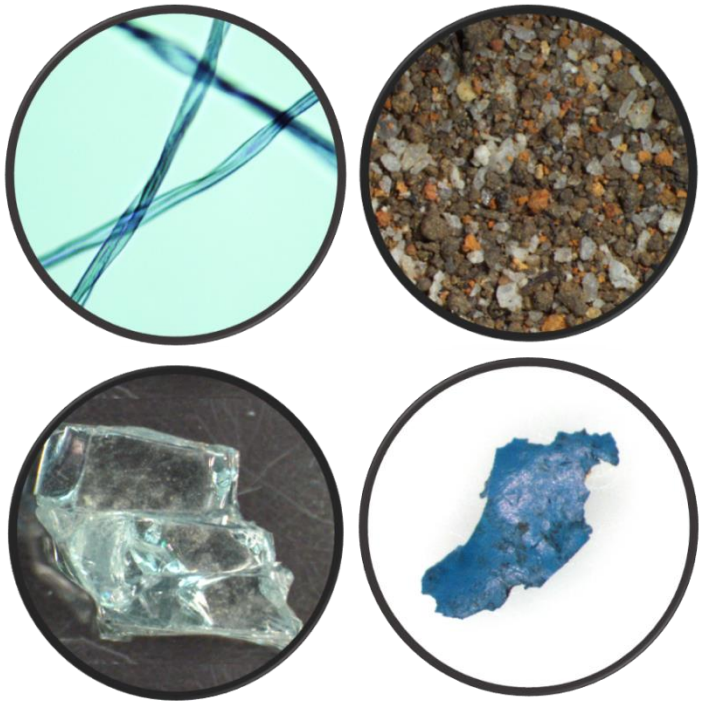
Learning Objectives

By the end of this session the learners will be able to:

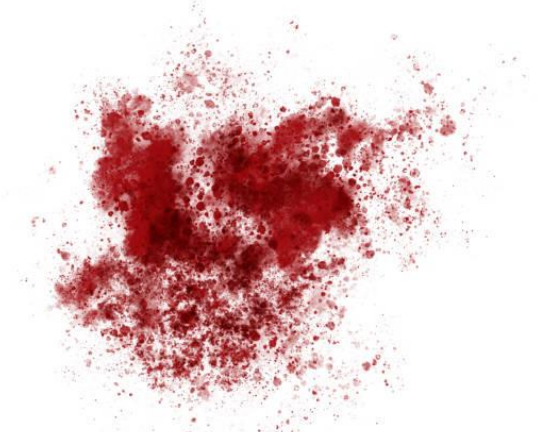
- Describe trace evidence
- Classify trace evidence
- Describe Locard's exchange principle.
- Describe composition of blood and characteristics of different blood cells.
- Describe basic genetic principles related to blood groups and blood groups as hereditary factors

Trace Evidence

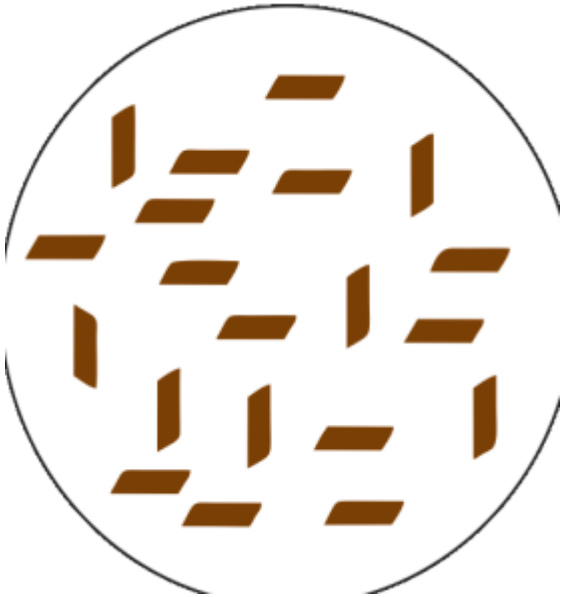
- Definition
- **Classification**
  - Biological group
  - Non-biological group
- Edmond Locard (1877-1966)
  - Locard's exchange principle
  - Counterfeit coins case
  - Rape case
  - Ricocheted bullet
  - Investigating officer role

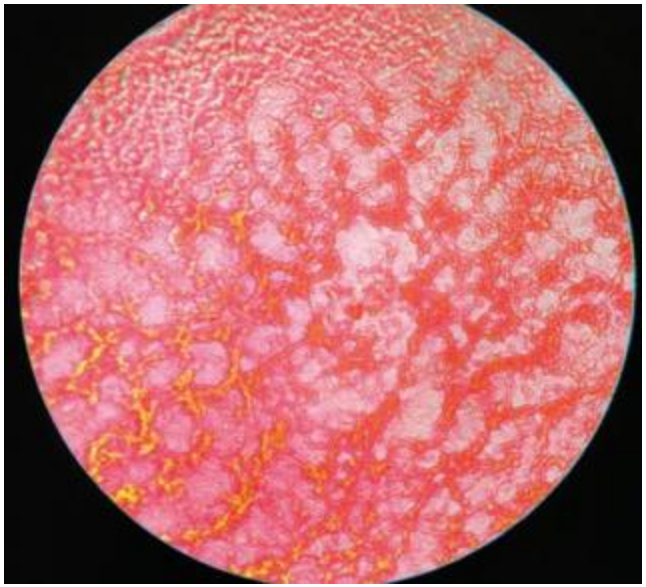


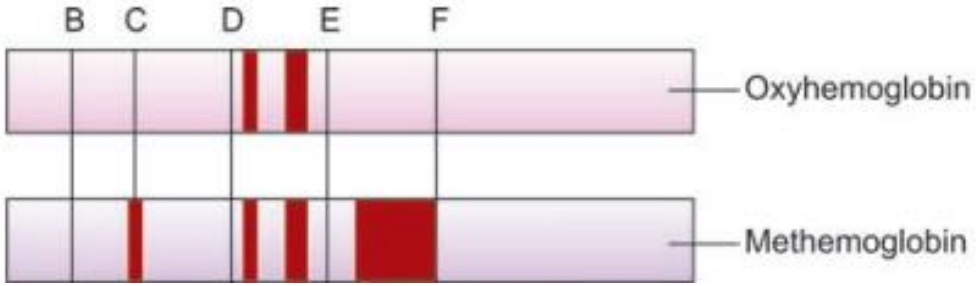
Blood As Trace Evidence

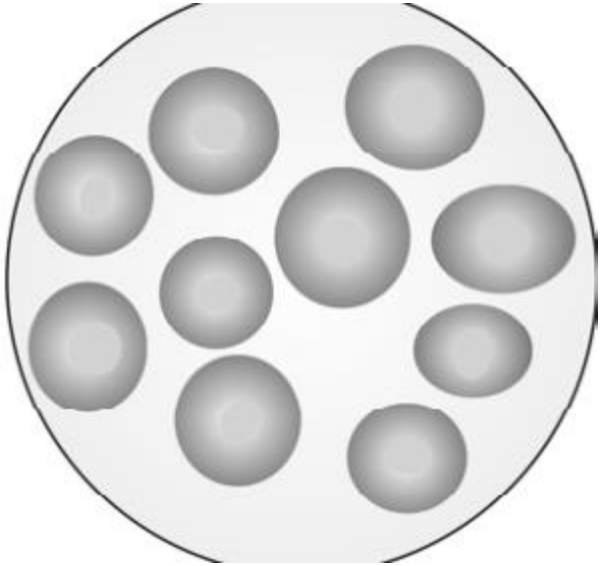


- **Blood and bloodstains**
  - Is it bloodstain?
    - Screening Tests
    - Crystal Tests: Teichmann test (Hemin crystal test), Takayama test (Hemochromogen crystal test)
    - Microscopic Examination
    - Spectroscopic Examination
  - If blood, whether human or animal?
  - If human, then






B
C
D
E
F
Oxyhemoglobin
Methemoglobin

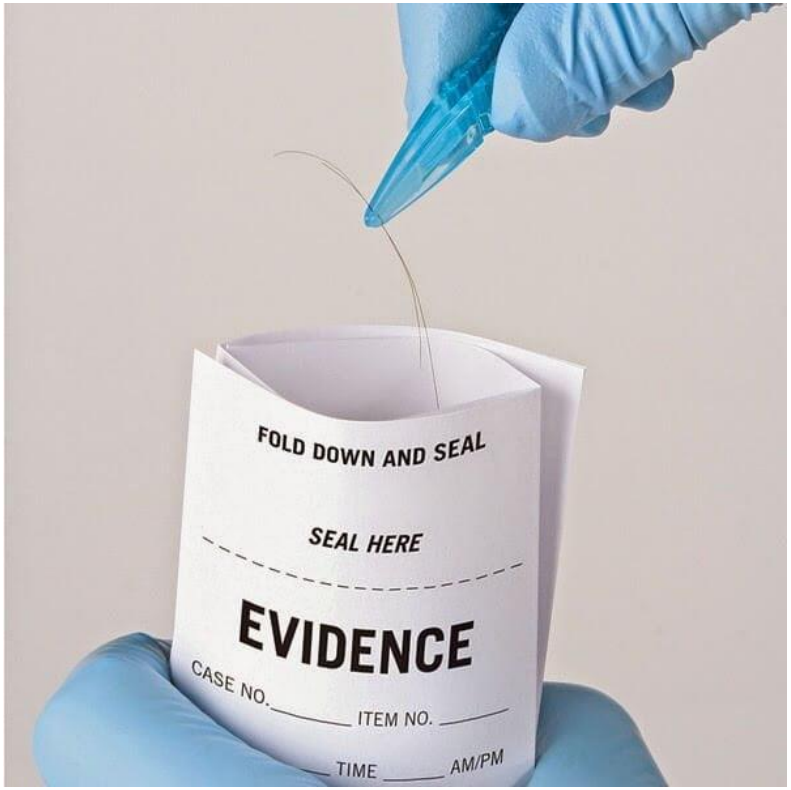


Blood As Trace Evidence

- Age of stain
- Sex
- Source
- Antemortem/postmortem
- Blood group

Hair As Trace Evidence

- **Examination of hair**
  - Confirm it as a hair
  - Confirm it as a human hair
  - Site of origin of hair
  - Injury to hair
  - Singed hair
  - Stains on hair
  - Identity
  - Poisoning

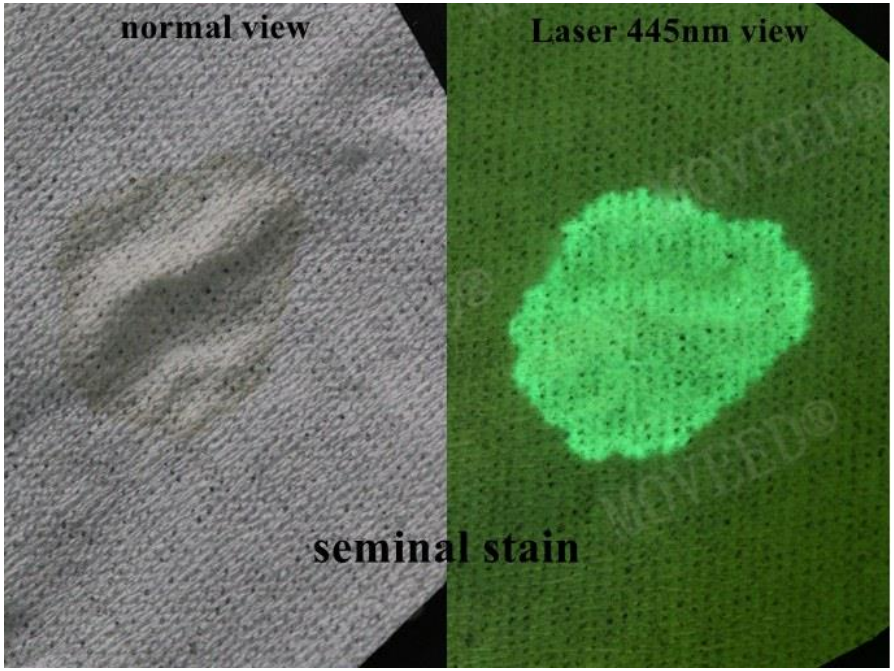


Hair As Trace Evidence

- **Examination of hair**
  - Miscellaneous information
    - Identifying the weapon/vehicle of crime
    - In rape/other sexual offenses
    - In bestiality
    - Rate of growth of hair

Seminal Stains As Trace Evidence

- **Chemical tests:**
  - Florence test and
  - Berberios test
  - Acid phosphatase test
  - Precipitin test
  - Grouping



Salivary Stains As Trace Evidence

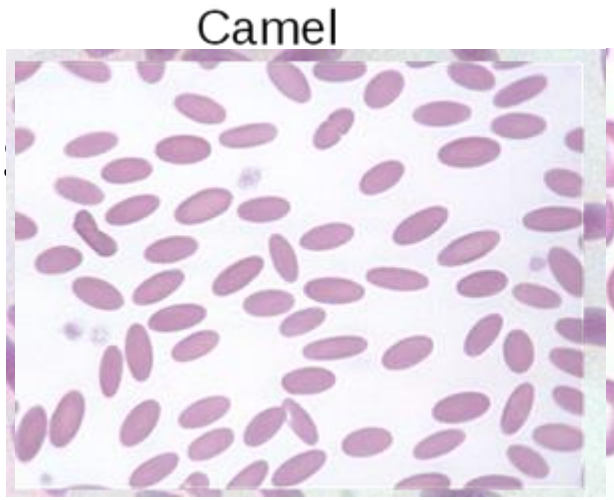
- Asphyxial cases
- Amylase
- Species-specific test
- Grouping

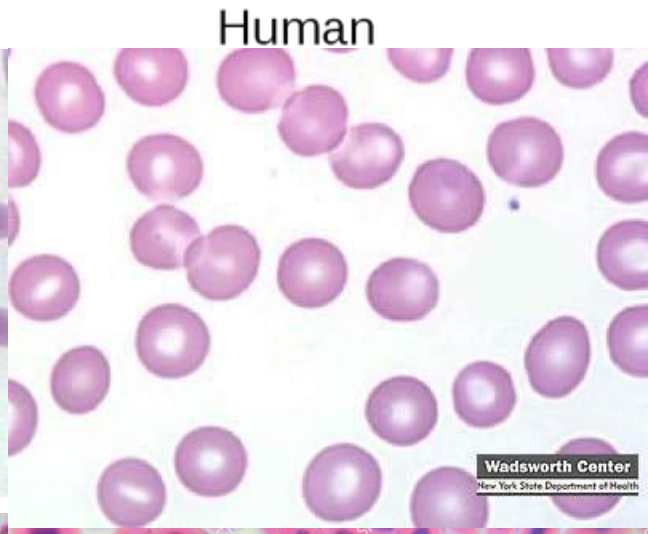
Urinary Stains As Trace Evidence

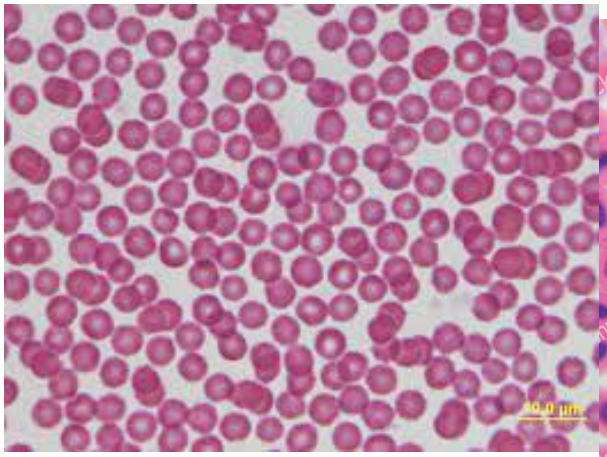
- Grouping
- **Faecal stains As Trace Evidence**
  - Microscopic examination
  - Chemical tests
  - Grouping
- Duty of doctor

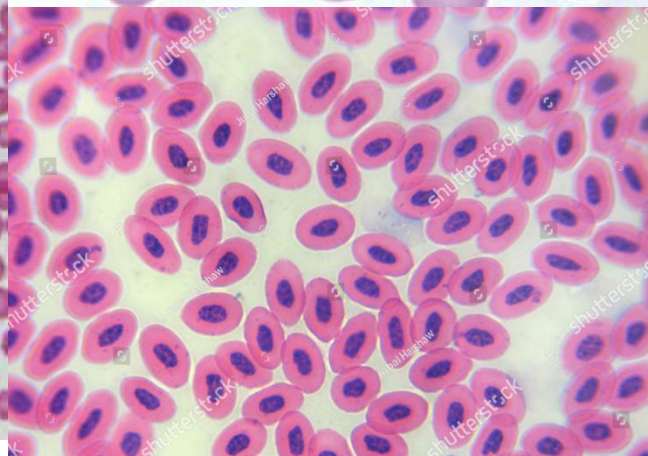
Blood As Trace Evidence

- Biological material at the scene of crime
- Blood
- Red blood cells
  - Human
  - Birds
- WBCs
- Platelets
- Plasma





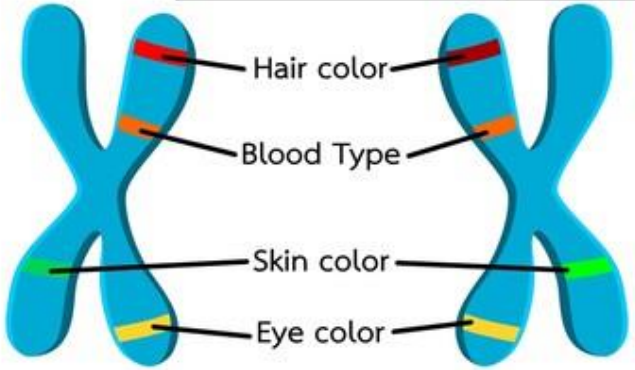




Basic Genetic Principles

- Genes
- Alleles
- Homozygous
- Heterozygous
- Phenotype
- Genotype
  - Blood group A, B
  - Blood group O
  - Blood group AB

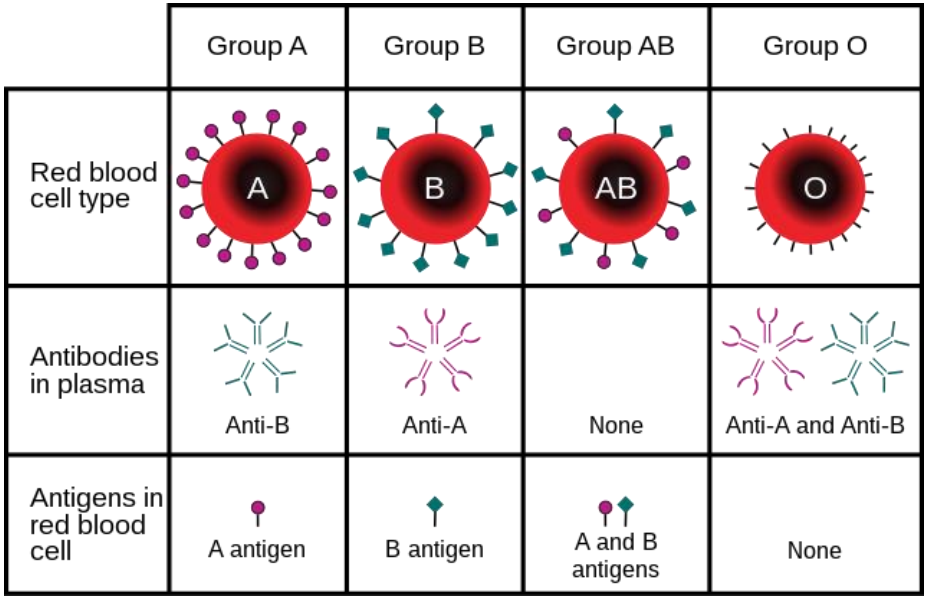
Genes Inherited (Genotype)	Blood type (Phenotype)
A, A	A
A, O	A
B, B	B
B, O	B
A, B	AB
O, O	O



Chromosome

Blood Groups As Hereditary Factors

- ABO, MN, Rh
- Inheritance principles
  - Group characteristics remain unchanged
  - Mendel's laws of inheritance
- In ABO system
- In MN system
- In RH system
- Secretor factor



Blood group of parent 1	Blood group of parent 2	Possible blood group of children	Not possible
O	O		
O	A		
A	A		
O	B		
B	B		
A	B		
O	AB		
A	AB		
B	AB		
AB	AB		

P 1	P 2	Child
M	N	
M	M	
N	N	
MN	MN	

Differentiating Features

	Putrefaction	Maceration	Mummification	Adipocere formation
Color				
Odour				
Feel				
Body contour				
Facial feature				