

Serology is the properties and effect of serums in analysing blood trace. The evidence of the biological particles in semen, saliva. Faecal matter and perspiration. This all is done to detect the presence of foreign particles in blood. Other foreign particles like presence of the drugs, alcohol or poisons in urine are carried out by specialist in toxicology or chemistry. Serology is the properties and effect of serums in analysing blood trace. The evidence of the biological particles in semen, saliva. Faecal matter and perspiration. This all is done to detect the presence of foreign particles in blood. Other foreign particles like presence of the drugs, alcohol or poisons in urine are carried out by specialist in toxicology or chemistry. Karl Landsteiner in the beginning of the twentieth century demonstrated that serum of persons would agglutinate, the red blood cells contain antigens factors and blood serum contains the antibodies. Two antigens, A and B, were identified with two antibodies i.e. anti-A, and anti-B. So if a person has one of the two antigens so his/her blood type will be A or B. Landsteiner in 1927 also discovered additional blood group known as MN System and in 1940, Rh Blood group. In 1910 scientist discovered that blood groups were having certain traits that are inherited (genetics laws), so it could be used for the case of paternity in criminal investigation. In 1985 major breakthrough in Forensic science occurred through forensic serology. Alec Jeffrey and his colleagues discovered the DNA structure.

Physical properties of Blood: 1. Blood is specialized tissue of human body. The main function of blood is to supply nourishment especially oxygen to the cellular elements of the tissue of the other parts. Removing the waste products of the metabolic activities, especially carbon dioxide. It maintains the required temperature of the body, proper balance of the fluid substances in the human body. Blood circulate through heart, arteries, capillaries and vein. It consists of plasma, RBC, WBC, platelets. Blood colour is red due to the presence of haemoglobin. Haemoglobin binds the oxygen in the inhaled air in the lungs. Plasma is liquid part in blood mixtures, while RBC, WBC and platelets are solids parts. Clotting of the blood takes place due to separation of fibrin from plasma. Then liquid left behind is called serum. Generally human body consists of five and

half litres of the blood. Due to duration of time on exposure of the blood its colour gets changed. Cells structures get destroyed and protein also loses their characteristics. Fresh blood appears bright red in colour, after 7 Anthropology Forensic Anthropology Morphological, Serological and Biochemical Methods twenty hours blood colour becomes brown- red. After twenty four hours it becomes dark brown or black in colour. 2. Drying of blood get affected by the amount of blood, humidity, temperature, light, rain, wind condition, sources of blood stain, nature of surface bearing stains. 3. Frothy blood comes from lungs; Nasal blood comes from nasal mucus and consists of nasal hairs. While vomited blood colour is chocolate. Menstrual blood is dark in colour containing vaginal epithelial cells and endometrial cells. Blood stains on metallic surface seems to rust. 2.2 Significance of Blood group systems. Blood groups are very useful in identifying the problems of paternity like: a). To identify blood stains and other body products. b). To solve the cases of paternity, maternity disputes. It's based on the fact that blood groups are inherited according to the Mendel laws. For example in case where putative father and mother of child both having blood group "O" but child blood group is B. So this kind of case can be solved by the Mendel's first law of inheritance. i.e. Law of segregation. Second Example when parents are homozygous for any blood group genes. Child of these parents must carry each gene. When father is Rh -ve so each child inherits Rh -ve. Any of the child having Rh type +ve belongs to another father. This case can be solved by the Rhesus system.

Some of the tests to determine the paternity cases they are following: Duffy, Kell, Lutheran Lua , MNS, RH and ABO (A1, A2). 1. Lutheran Group: Paternity can be accepted only after the first order exclusion. When child is Lu a and antigen is not found in putative father and mother. But it has to be seen very carefully because suppressor gene which inhibits both Lua and Lub is known to occur in Lutheran system. So to prove suppressor gene is working or not must test the family with anti Lub . 2. Duffy Blood group: to test the paternity anti fy a antibody is tested with fya antigen. We should be very careful for the presence of the alleles which are negative anti fy a and anti fy b . 3. ABO blood groups. This system is very useful since several years in family studies. Only minimal cases show the

abnormalities. In case of mutation where mother was A, B, and child group is O. Or in the case where in on 2.2.2. In recent years more advanced techniques have been developed to determine paternity i.e. 1. Human Leukocyte Antigen (HLA): High degree of discrimination of HLA systems make more accurate probability for determining paternity. It caused the revolution in paternity determination after combining HLA with red cells antigens test. Case 1. For HLA: In a New York court generally accepted, the HLA for paternity dispute in solving the case of Goodrich v. Norman. Court held that alleged father has right to not exclude from the HLA red cells antigen test. Judge of the court found that HLA techniques widely accepted by the scientist. It proved that organ transplant is used to match the donor and recipients. It's very important when dealing with the lives of the patients. Case 2. For HLA: In New Jersey Malvasi vs. Malvasi case. Court granted the putative father motions to oblige mother to have HLA testing. Because HLA testing was highly recognised by the scientific community. 2. Red cell enzymes and blood serum protein by electrophoresis method: Many Blood serum proteins and red cell enzymes have proven useful in determining the paternity test. By electrophoresis method. Because proteins and enzymes process follow the Mendelian inheritance patterns.

Analysis of Blood: Locating blood on objects: If some dark or red stain is found that means it's blood. Sometimes stains may be very small or on the dark surface of the floor. There are some test to determine the blood stains are: i) Luminol Blood test, ii). Fluorescein test. Luminol Test: Luminol is reagent which by help of hydrogen peroxide goes to oxidation on alkaline solution in the presence of heme fraction of haemoglobin. Heme Catalyzed the reaction but it doesn't take part in reaction. Haemoglobin is present in the blood which carries the oxygen and carbon dioxide from cells and to cells. ical and Biochemical Methods product of reaction 3-aminophthalanate, goes reaction Chemiluminescence (Chemiluminescence refers to emission of light from a chemical reactions in solid, gas or liquid matters.) After forming the product its emit the lights on its own. So during the crime scene, area is darkened and luminal reagent test is applied there. No extra light need for this. When Luminol reagent is applied it appears too blue to yellow green colour. Which show the presence of the blood. This colour is

last for the 30 seconds after applying another reagent. Fluorescein: Also emits lights when it reacts with oxidant and heme. It undergoes to fluorescence. In the suspected place of the blood stain its applied with hydrogen peroxide. Strong emit light is used to induce fluorescence. Confirmation of blood test: Luminol and fluroscene are not specifying for the blood. Although it's very useful for locating on large surface. There are two tests for confirmation of the blood i.e. i) Takayamatest ii) Teichmann test. Takayama test and Teichmann test both is microcrystalline test. When a crystallined reagent is aaded to suspect blood. A formation of crystal shaped by the reagent and heme is given the confirmatory for the blood.

Blood stain patterns Analysis: Blood stain pattern used to interpret at crime scene to create action that cause the blood shed at different patterns. Blood pattern analysis having some biological, physics and mathematics principle i.e. Behaviour of blood, capillary action, velocity and cohesion, geometry shape and angle through which blood flows.

Types of stains are basically three types: 1. Passive stain: It includes flow, pool and drops. Gravity acting on an injured body. 2. Transfer stain: Existing bloodstains and leaving wipes, patterns, swipes of the blood by shoe, print or body dragged so it leaves the smear. 3. Projected or impact stains. When the blood projected through air and seen spatter, it includes gushes, splashes and arterial spurts.

Some others biological stain and fluids like:

1. Saliva.
2. Vaginal secretions.
3. Seminal fluid.

Saliva is secret in mouth for digestion of fooTest for saliva is "alpha amylase test'. Alpha amylase is an enzyme useful in breaking the starch present in the food. To identify alpha amylase, the starch- iodide test is used. Saliva for Paternity Test: Saliva has been proved for the paternity solving cases. Saliva having the good sources for the DNA. In several studies it has been proved that DNA banding obtaining patterns from saliva or saliva stained is good sources. It's helpful in giving the justice to the victims to proved alleged father to be biological father. d.

It consists of water, proteins, enzymes and salts. Saliva secretion is mostly from sublingual (4%), submandibular (71%), and parotid (25%). These all glands are known as salivary glands. Density of saliva is higher than water and ranges from 1.002 to 1.012. Saliva is slightly acidic in nature (pH 6.02 to 7.05). The solid substances consist of several cells such as epithelial cells, yeast bacteria. Enzymes are ptyalin i.e. lipase, amylase, phosphate etc. Vaginal secretions: Test used for vaginal secretions is “glycogenated epithelial cells”. The glycogenated cells are formed during the menstruation cycle and its quantity depends on the menstruation cycle. Menstruation cycle produce the ovulation and ovulation produce highest numbers of glycogenated cells. Glycogenated cells stain with “periodic acid-Schiff reagents’. After staining glycogenated, it gives bright magenta colour.

3. Seminal fluid: Semen is mixture of variety of organic, inorganic, sperms and cells. Sperms consists of head and tails. Head contain DNA from male and tails helps in moving. Semen is a viscous whitish secretion of male reproductive organs contains spermatozoa, and consisting of secretion of testes, prostate, bulbourethral gland and seminal vesicles. The pH level of seminal fluid is 7.2-8.0 is alkaline which help in neutralizing acidic environment of the vagina that cause harm to sperm cells. Zinc presented in prostate secretion is useful in stabilizing the DNA – containing chromatins in the sperms cells. Sperms are

Seminal stains detection test are:

1. Acid phosphate test.
2. Creatinine in phosphokinase.
3. Ammonium Molybdate test.
4. Florence Test.
5. Barberio Test.
6. Semen Specific Glycoprotein (p30) Test.
7. Enzyme linked immunosorbent assay (ELISA).
8. LDM Isoenzyme test.
9. Acid Phosphate isoenzyme method: e made up of Head, Mid piece and Tail.