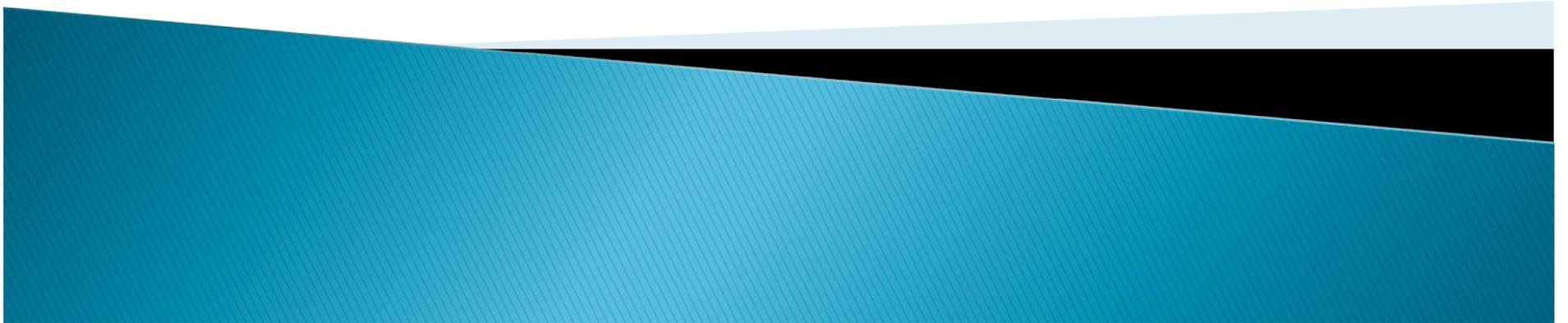


Soil Examination

FORENSIC SCIENCE

DR. WARDISIANI

SCHOOL YEAR 2023-2024



BELL RINGER:

A) WHAT IS THE LIFE CYCLE OF A BLOW FLY?

B) IN THE PICTURE, IS THIS LIVING OR DEAD TISSUE?

EXPLAIN



Introduction

- ▶ **SOIL** IS PRODUCED BY A COMPLICATED PROCESS THAT IS INFLUENCED BY FACTORS SUCH AS TEMPERATURE, RAINFALL, AND THE CHEMICAL AND MINERALS IN THE MATERIAL FROM WHICH IT FORMS.
- ▶ SOIL FROM DIFFERENT LOCATIONS CAN HAVE DIFFERENT PHYSICAL AND CHEMICAL CHARACTERISTICS THAT ARE USEFUL.



- ▶ THE UNIQUENESS OF SOIL COMPOSITION CAN HELP LOCATE BURIAL SITES AND LINK SUSPECTS TO CRIME SCENES.
- ▶ REAL AND FICTIONAL INVESTIGATORS HAVE BEEN USING SOIL SAMPLES TO IDENTIFY CRIME SCENES SINCE THE LATE 1800'S.
- ▶ BETWEEN 1887 AND 1893, SIR ARTHUR CONAN DOYLE WROTE ABOUT THE USE OF GEOLOGY IN THE INVESTIGATION OF CRIME IN HIS NOVELS.



History of Forensic Soil Examination

- ▶ A GERMAN INVESTIGATOR, GEORG POPP, IS CREDITED WITH BEING THE FIRST FORENSIC SCIENTIST TO USE SOIL EVIDENCE TO SOLVE CRIME.
- ▶ DURING THE MURDER INVESTIGATION, HE EXAMINED A HANDKERCHIEF LEFT AT THE CRIME SCENE AND FOUND THAT IT CONTAIN BITS OF COAL AND PARTICLES OF HORNBLLENDE.



Soil Composition

- ▶ SOIL IS THE TOP LAYER OF THE EARTH'S CRUST, WHERE MOST PLANTS GROW.
- ▶ SOIL CONTAINS MINERALS, DECAYING ORGANISMS, WATER, AIR ALL IN VARYING AMOUNTS.
- ▶ SOIL TEXTURE DESCRIBES THE SIZE OF THE MINERALS PARTICLES THAT MAKE UP SOIL.



- ▶ THERE ARE THREE SOIL GRAIN SIZES: **SAND**, **SILT** AND **CLAY**.
- ▶ THERE ARE ALSO THREE SUBCATEGORIES OF SOIL: LOAM, PEAT AND CHALK
- ▶ SOIL FORMS IN HORIZONS, OR LAYERS, THAT ARE MORE OR LESS PARALLEL TO THE EARTH'S SURFACE.



Soil profiles

- ▶ SOIL IN ANY GIVEN AREA WILL HAVE A UNIQUE PROFILE OR SEQUENCE LAYERS.
- ▶ THE UPPERMOST HORIZON IS CALLED THE O HORIZON. THIS LAYER IS MADE MOSTLY OF ORGANIC MATTER, REFERRED TO **HUMUS**.
- ▶ BENEATH THE O IS THE A HORIZON, THE SOIL HERE IS DARK IN COLOR. THE A HORIZON IS CALLED THE TOP-SOIL. SEEDS SPROUT AND PLANTS GROW IN THE A HORIZON.



Soil profiles Continued...

- ▶ THE E HORIZON IS LIGHT IN COLOR, AND IS MADE MOSTLY OF SAND AND SILT. WATER DRIPPING THROUGH THE SOIL IN THIS LAYER CARRIES AWAY MOST OF THE MINERALS AND CLAY PRESENT...THIS PROCESS IS CALLED **LEACHING!**
- ▶ THE **"B" HORIZON** LIES BENEATH THE E HORIZON. ANOTHER NAME FOR THIS LAYER IS CALLED SUB-SOIL.



- ▶ THE SUBSOIL CONTAINS CLAY AND MINERAL DEPOSITS THAT HAVE LEACHED OUT FROM LAYERS ABOVE IT AS WATER DRIPS THROUGH FROM THE HORIZONS ABOVE.
- ▶ THE “C” HORIZON IS NEXT. THIS LAYER IS MADE OF PARTIALLY BROKEN-UP ROCK. PLANT ROOTS DO NOT GROW IN THIS LAYER. IF THERE IS A SOLID ROCK LAYER UNDERNEATH ALL OF THE OTHER HORIZON, IT IS CALLED THE “R” HORIZON.



Chemistry of Soil

- ▶ THE MATERIALS THAT MAKE UP A TYPE OF SOIL DETERMINES THE SOIL'S CHEMICAL PROPERTIES.
- ▶ AN IMPORTANT CHEMICAL PROPERTY OF SOIL IS WHETHER IT IS ACIDIC OR BASIC.
- ▶ THE PH OF A SOIL CAN HELP DETERMINE IF A PLANT WILL GROW AND SURVIVE.
- ▶ IT IS THE CHEMICALS IN THE SOIL THAT WILL IN RELATIONS TO THE AMOUNT OF WATER PRESENT CAN DETERMINE ITS NUTRIENT EFFECTS.



- ▶ **NITROGEN DEFICIENCY:** YELLOW LEAVES AND PLANTS
- ▶ **PHOSPHORUS DEFICIENCY:** SMALL PLANTS WITH REDDISH LEAVE.
- ▶ **POTASSIUM DEFICIENCY:** LEAVES AT BOTTOM OF PLANT DYING FROM LACK OF CHLOROPHYLL
- ▶ **CALCIUM DEFICIENCY:** STEM AND LEAVES DROOP, UNABLE

