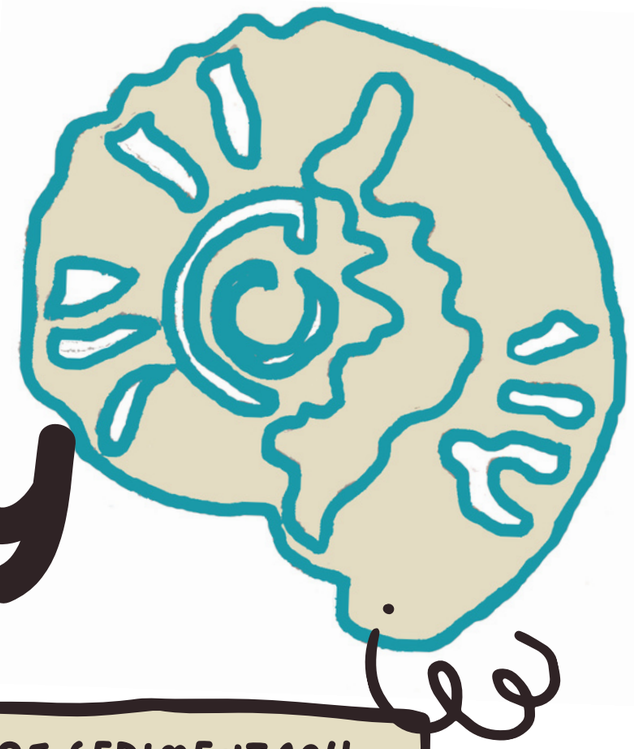
WHAT IS GAULT CLAY



LEARNING OBJECTIVES

1. TYPE OF SEDIMENTARY ROCK
2. TO UNDERSTAND THE ROCK PROPERTY: PLASTICITY

YOU WILL NEED

- CLAY
- WATER
- MEASURING CYLINDER/JUG
- GRAPH PAPER
- RULER/TAPE
- NEWSPAPER

DURATION
1 HOUR

DIFFICULTY
MEDIUM

CLAY IS A MALLEABLE MATERIAL THAT CAN BE MOULDED AND SHAPED, THIS QUALITY IS CALLED PLASTICITY.
WHEN HEATED, CLAY CAN BE HARDENED AND SET TO SHAPES, THIS PROCESS IS CALLED CERAMICS.
HUMANS HAVE USED CLAY THROUGHOUT HISTORY TO MAKE OBJECTS, INCLUDING BRONZE AGE BEAKERS (DRINKING VESSELS), ANGLO-SAXON JEWELLERY, AND INDUSTRIALLY FOR TILE AND BRICK MAKING FOR BUILDING MATERIALS.

GAULT CLAY IS A TYPE OF SEDIMENTARY ROCK.

IT IS MADE UP OF BOTH CLAY AND NON-CLAY MINERALS. THE MAJOR CLAY MINERALS INCLUDE KAOLINITE, ILLITE AND SMECTITE.

IT HAS A DARK BLUE-GREY COLOUR AND HAS A FINE GRAINED TEXTURE, THAT WHEN EXPOSED TO WATER BECOMES HEAVY AND THICK.

GAULT CLAY WAS FORMED BETWEEN 100 AND 112 MILLION YEARS AGO IN THE CRETACEOUS PERIOD.

AFTER THE SANDY BEACH AND TIDAL CONDITIONS THAT CREATED THE LOWER GREENSAND ROCK, SEA LEVELS BEGAN TO RISE AGAIN. IN THESE DEEP AND CALM SEA CONDITIONS ONLY FINER GRAINS OF SEDIMENT COULD BE CARRIED AWAY FROM LAND AND DEPOSITED ON THE SEA BED. THESE FINER SEDIMENTS ARE KNOWN AS SILTS AND FORMED THE ROCK CALLED GAULT CLAY.

THESE WARM SEAS WERE HOME TO A VARIETY OF MARINE LIFE, WHICH CAN BE SEEN AS FOSSIL EVIDENCE IN THE GAULT CLAY INCLUDING AMMONITES, UNCOILED AMMONITES, BIVALVES, BELEMNITES, CRABS, GASTROPODS, BUTTON CORAL AND SHARKS.

COPT POINT IN FOLKESTONE, IS A VERY IMPORTANT SITE FOR FOSSIL EVIDENCE AS THE ONLY NATURAL EXPOSURE OF GAULT CLAY IN THE REGION.

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WHAT IS GAULT CLAY

SHRINKING AND SWELLING

SOILS OF, OR NEAR, THE GAULT CLAY ARE PRONE TO THE SHRINK-SWELL PROCESS, WHICH MEANS THEY CAN GAIN AND LOOSE MOISTURE.

AFTER RAINFALL, THE SOILS CAN ABSORB A LOT OF WATER, EXPANDING AND BECOMING STICKY AND HEAVY. BUT WHEN DRY THE SOILS CAN BECOME VERY HARD, SHRINKING AND CRACKING.

WHEN BUILDING ON OR NEAR GAULT CLAY, SHRINK-SWELL BEHAVIOUR CAN CAUSE STRUCTURAL CHALLENGES TO ENGINEERS AND BUILDING DAMAGE.

LANDSLIDES

THE GAULT CLAY HAS A HISTORY OF LANDSLIDES. THIS IS WHEN A LARGE AMOUNT OF ROCK, SOIL OR DEBRIS MOVES DOWN A SLOPE.

THIS CAN HAPPEN SLOWLY OVER A PERIOD OF TIME OR SUDDENLY.

LANDSLIDES OCCUR WHEN THE FORCE OF GRAVITY IS STRONGER THAN THE RESISTANT FORCES OF THE SLOPE.

THIS MAY BE BECAUSE THE SLOPE MATERIAL HAS BEEN WEAKENED BY WEATHERING, BY EROSION OR THROUGH WATER SATURATION, AND CAN ALSO BE CAUSED BY EARTHQUAKE AND HUMAN ACTIVITY.

LANDSLIDES CAN BE CATEGORISED INTO FOUR TYPES: FALLS, TOPPLES, SLIDES (ROTATIONAL & TRANSLATIONAL), FLOWS.

ENGINEERING

SINCE ITS OPENING IN 1844, LANDSLIPS HAVE BEEN A FEATURE OF THE FOLKESTONE TO DOVER RAILWAY LINE. IT RUNS THROUGH THE FOLKESTONE WARREN WHICH HAS AN ACTIVE LANDSLIDE, BECAUSE OF ITS GEOLOGY WITH CHALK OVERLYING GAULT CLAY.

RAINFALL WATER MOVES THROUGH THE POROUS CHALK AND MEETS THE CLAY, SATURATING IT AND SITTING ON TOP. THIS WET CLAY THEN CREATES INSTABILITY.

IN 1915 A SERIES OF LANDSLIPS OCCURRED CLOSING THE LINE, INCLUDING A ROTATIONAL LANDSLIDE OF THE GAULT CLAY WHICH LED TO THE TRACK BEING TWISTED AND WARPED AND A TRAIN DERAILED. IN THIS YEAR THERE WAS ALSO THE 'GREAT FALL', WHERE 1.5 MILLION CUBIC METRES OF CHALK FELL INTO THE SEA.

MOVEMENT AND WEATHER IS NOW REGULARLY MONITORED AND INSPECTED BY ENGINEERS TO ENSURE THE SAFETY OF THE RAILWAY LINE. (NETWORK RAIL)

ACTIVITY

1. COVER THE FLOOR WITH SHEETS OF NEWSPAPER, AND A SHEET OF GRAPH PAPER
2. ROLL SOME CLAY INTO A BALL AND MEASURE ITS WIDTH/DIAMETER
3. FROM A 2M HEIGHT, DROP THE BALL OF CLAY ONTO THE GRAPH PAPER
4. USING THE GRAPH PAPER, MEASURE THE 'SPLAT' WIDTH OF THE CLAY, AND RECORD A NOTE
5. REPEAT STEPS 2 & 3 & 4 SEVERAL TIMES TO CREATE AN AVERAGE
6. ADD A SMALL AMOUNT OF WATER TO THE CLAY, AND REPEAT THE PROCESS
7. REPEAT THIS A FEW TIMES, ADDING MORE WATER EACH TIME
8. USING YOUR RESULTS, PLOT A GRAPH SHOWING THE AFFECTS OF WATER ON THE PLASTICITY OF CLAY

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