A Visitor Services Division Project (Education Section), Heritage Malta

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Ghar Dalam Cave and Museum
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The Maltese Islands started to form around 35 million years ago, when sediments and dead marine organisms (plants and animals) were deposited onto a shallow seabed close to a large land mass. By time these sediments hardened and solidified. The deposition of material kept going on for some 30 million years. In time the environment changed and the animals and plants that were dying and falling to the bottom of the sea evolved and changed as well. This gave rise to the five different rock layers that make up the Maltese Islands and the different types of fossils that we find in them today.

The Origin of the Maltese Islands

The Five Main Layers

The Lower Coralline Limestone is the lowermost layer. It is made up of marine algae and millions of small animals. These are the fossils that one encounters in rocks while on a walk along the coast or in the countryside. These creatures are mostly sea urchins, oysters, snails, fish and many others.

The second rock formation is the Globigerina Limestone. This is the type of rock that is used for buildings. Globigerina is a minute snail. This rock formation is made up of the calcium that forms the snail’s shell.

On top of this layer there is a layer of Blue Clay, which is sometimes missing in some areas.

The Green Sand layer is also found in some areas especially in Gozo. In Malta it is much evident along Dingli Cliffs.
Some people think that in places like Ghar Dalam one can see remains of dinosaurs. The animals whose remains were found inside this cave are much more recent. They roamed Malta and Gozo around 500,000 to 10,000 years ago, in an age known as the Ice Age.

Most dinosaurs became extinct some 65 million years ago. This means that dinosaurs such as T-Rex, Triceratops and others died out around 30 million years before the Maltese Islands started to form on the seabed. Therefore, no matter how much we dig and how much we search, we can never find dinosaur bones in Maltese rocks.

Scientists today believe that some groups of dinosaurs such as Velociraptor managed to survive and evolved into a group of animals that we can see all around us every day, like birds.

The top layer, the Upper Coralline Limestone, is absent from the south side of Malta. This absence is the result of centuries upon centuries of erosion. This rock formation, with the exception of a number of animals, closely resembles the Lower Coralline Limestone.

When Africa moved north, it eventually collided with Europe and this gave rise to a number of major earthquakes. This movement formed mountain ranges as well as deep valleys. It was at this time that the top layer, including the Maltese Islands, broke the surface of the Mediterranean some 7 to 5 million years ago.
The Ice Age

Some 2 million years ago the earth started to experience a change in climate. Sea levels started to fall and ice covers started to form along the northern parts of Europe. This was the beginning of the Ice Age, or as it is known by scientists, the Pleistocene. The southern parts of Europe and the Mediterranean were never covered in ice but underwent a period of heavy rainfall. The waters from these rains led to the formation of valleys and caves.

Formation of the Cave: Għar Dalam is thought to have once been the end of an underground tunnel above which flowed a river through Wied Dalam. The valley we see today had not yet been excavated, so the river-bed was at a much higher level than the present cave entrance. The river gradually ate its way into, through, and well beyond the underground tunnel, reaching ultimately the level of the present valley bed. The two ends of the tunnel were thus left perched high on either side of the valley. One end is now Għar Dalam, while the opposite end is known simply as ‘the Second Cave’.

Cave Deposits: The overflowing river gradually ‘ate’ its way deeper and deeper into the limestone until it reached the tunnel’s roof and breached it. This formation of the cave happened in the early periods of the Ice Age, but the collapse of the cave’s roof happened when herds of hippopotami and elephants roamed the Maltese countryside. The opening of the tunnel roof acted as a swallow-hole. Soil, pebbles, stones, carcasses of dead animals, dismembered skeletal parts and other debris dragged by the river were sucked into the tunnel and deposited within. The pile of soil and bones gradually spread laterally but never reached either end of the tunnel. This explains why most of the bones are limited to the first 75 metres.

The lowermost layer inside the cave is made up of dissolved clay and does not contain any animal remains.
In the second lowermost layer, called the Hippopotamus layer, thousands of molars and other skeletal parts have been discovered. Two species of hippopotamus have been identified. However, bone remains were not restricted only to Hippos. Two species of elephants were also found, together with dormice, bats and birds. What made all these animals special was the fact that while some became smaller than normal, others turned into giants.

During the Ice Age, most of Europe was covered by ice and snow. In the Mediterranean there were no ice formations but there was a lot of rainfall. As a consequence of the cold temperatures, the sea-level dropped by some 250m uncovering the submarine banks between Malta and Sicily. These acted as land bridges for migrating animals. When the sea level rose again to its former level, the Mediterranean islands were isolated once more. Large herds of hippopotami and elephants were trapped on them. Forced to live on an island with limited moving space and food, the trapped animals had to adapt in order to survive. Gradually, they started to evolve into smaller forms, as a smaller size requires less food. The absence of predators like lions or other carnivores helped when they evolved into dwarfs, as there was no danger of being predated. Remains of other species of animals such as otters, giant tortoise and dormice, several species of bats and birds were also found.

It is important to note that the level of the sea between Malta and North Africa was never low enough to uncover the seabed. Animals such as elephants and hippopotami arrived in Malta from Sicily and not from Africa.

The third layer is made up of pebbles.

The fourth layer presents us with remains of other animals such as deer, bear, wolf and fox, along with other small mammals such as the wood mouse and the shrew.

The topmost layer is more of an archaeological rather than paleontological importance. In this layer, implements and pottery dating back to c.5200 BC were found. These are the first remains of man in Malta. These artefacts are now on display at the National Museum of Archaeology in Valletta. Here, the remains of domestic animals such as goat, horse and pig were found together with human remains. The brown rat probably arrived on rafts along with the cattle and other cargo.
Discovery and History of Excavations: In 1865 Professor Arturo Issel, an Italian geologist was searching for the presence of Neanderthal man in Malta. During one of his excursions in Wied Dalam, he came across a cave, half filled with soil and used as a cattle pen. Issel thought that an excavation at the site could prove fruitful. He dug a trench in the cave's loose soil and found human remains and a hippopotamus bone. Many followed Issel's footsteps. The most important excavations were those carried out by John H. Cooke (1892), Prof. N. Tagliaferro and C. Rizzo (1912), Dr T. Ashby and G. Despott (1914), G. Caton Thompson (1917), Dr J. G. Baldacchino (1933) and Dr. G. Storch (1970). Some of the material discovered is displayed in the old museum at Għar Dalam, which was opened to the public in 1935.

Use of cave: Throughout the years, the cave served for various purposes. The earliest inhabitants, some 7,200 years ago, used the cave as a place to live in. In the following years, closer to our times, the cave was used as a cattle pen. In fact, the far end of the cave was blocked so that no animal could venture into its dark interior. In June 1940, farmers and the small population located in the surroundings used the cave as an air-raid shelter during the Second World War. Four months later, in October, the cave was requisitioned by the Royal Air Force and was used to store aviation fuel. After the end of the war, the cave was returned to the Maltese Government. Għar Dalam was opened for public viewing in 1933 while the museum display was inaugurated in 1936.
Activity 1: Excavation

PREPARATION
The students gather inside the activity room and are assigned their respective roles. In the adjacent hall, they will wear aprons and hard hats and each team will then proceed to collect tool boxes, crates and paper folders. Accompanied by the teacher and the museum educator, they make their way towards the excavation site.

THE EXCAVATION
Two pits of different sizes are filled with sand and a number of bones and pottery have been buried in them. The first exercise is to uncover these remains. Each of the pits can represent one of the main layers found inside Ghar Dalam. In one excavation, Pit A may represent the Hipposotamus Layer and Pit B the Deer Layer. In another excavation, Pit A may represent the Sterile Layer and Pit B the Cultural Layer.

Strings are attached to the edge of the pit creating a grid. The size of the grid corresponds to the size of the grid paper provided. Each team, now sub-divided into three smaller groups, proceeds with the dig. Team A starts the excavation proper, while team B records all the finds. Team C cleans the excavated material (making use of brushes) and places the finds inside the plastic trays.

As soon as the time allocated expires, the whole class will converge inside the activity room. Here, with the help of charts and museum specimens, the students will have to identify and label each excavated bone. Finally, the team will prepare a short report on the dig (this can be done in class). Sufficient time is allocated for questions and comments.

AT THE DIG SITE
TEAM A: With the use of trowels, sand is removed from the pit into plastic bags. After a bone is discovered, this is carefully extracted from the pit and placed in the plastic tray or tub.
TEAM B: One student records the finds onto the paper sheets, a second student will draw on the grid paper the exact location from where the bone was extracted.
TEAM C: With the use of paint brushes and toothbrushes, Team C will clean the bones and prepare them for identification.
Activity 2: Museum Hunt

1. In which date did Gian Frangisk Abela first mention Ghar Dalam in his book ‘Della Descrittione di Malta’?

2. Little, if anything, was known about Ghar Dalam’s treasures until a Genoese geologist came to Malta in search of Neanderthal man in this cave. Who was this person?

3. Look closely at the showcase where there is a model of the formation of Ghar Dalam. Please draw the three stages of formation together with a short note near each diagram.
4. Did Malta experience an Ice Age?
   - Yes
   - No

b. What did Malta experience instead of solidifying ice?


c. Name two effects of the Ice Age which the Maltese Islands experienced.


d. Name the two evolutionary changes which the animals during that time had to undergo to ensure survival.

5. Name one species of animal that experienced nanism.

6. Do you think that the phenomenon mentioned in Questions 4 and 5 was a rapid change or a slow and progressive one?

7. Is the Ice Age something of the past or something that we are going through today?

8. The Maltese Archaeology is divided into different phases. Which is the earliest phase?
   - Ghar Dalam Phase
   - Bronze Age Phase
   - Temple Phase

9. What is the National Plant of Malta called?
The Sandarac Gum tree or Gharghar is the National Tree of Malta. Do you think it is only found (endemic) in the Maltese Islands?

☐ Yes
☐ No

How long is the whole cave?

__________________________

Measure the length that is accessible to the public.

__________________________

Are stalagmites found on the floor of the cave or on the ceiling of the cave?

__________________________

Six layers are present in the cave. Name the missing layers

1. Calcareous sheet
2. 3.
4. Hippopotamus layer
5. 6.
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