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Khasfait Tha Fujait Cave

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ISSN: 2789-7788 (Online)

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Khasfait tha Fujait Cave

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With participation



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Abstract

On an exploratory journey from 14th to 17th of September 2021, the Omani Caves Explorations Team (OCET) visited three different caves in Al Mahra province in the Republic of Yemen to study and document them. The visit was in cooperation with the Office of Al Mahra Governor, the Yemen Geological Survey and Mineral Resources Board, Sana'a University and The Mehri Language Center for Studies and Research.

During the exploration, the team successfully documented the legendary Khasfat tha Fujait, also known as 'Well of Barhout', which is one of the famous caves in the Arabian Gulf that has long been the subject of much mythology and folklore. The team reached the bottom of the well and documented the hole's geological and environmental features, carried out measurement and collected data and rock samples, all of which were documented by photos. The team also visited two different caves in Al Mahra province which are Tayyeh and Askhanait caves. In this report, the most important features of the caves which were visited by the OCET will be presented with reference to some important notes that must be taken into account by the local authority to sustain the ecosystem of the caves.



In the morning of the 14th of September 2021, the OCET started the exploration journey from Nizwa, Sultanate of Oman, towards the wilayat of AlMazyunah. They crossed the Omani-Yemeni borders and spent the night at Shahan District. The next day, the team visited Khasfat tha Fujait. On Thursday (16th of September), the team explored Tayeh Cave and Ghaydah City. and on the next day, they visited Askhanait Cave.



Figure (1) The black line refers to the itinerary of the Omani team’s journey to explore Al Mahra Caves in Yemen from 14 to 18 of September 2021. The red circles refer to the locations of the caves and the main cities that were visited by the team. The blue lines show the paths to the caves.

Abstract

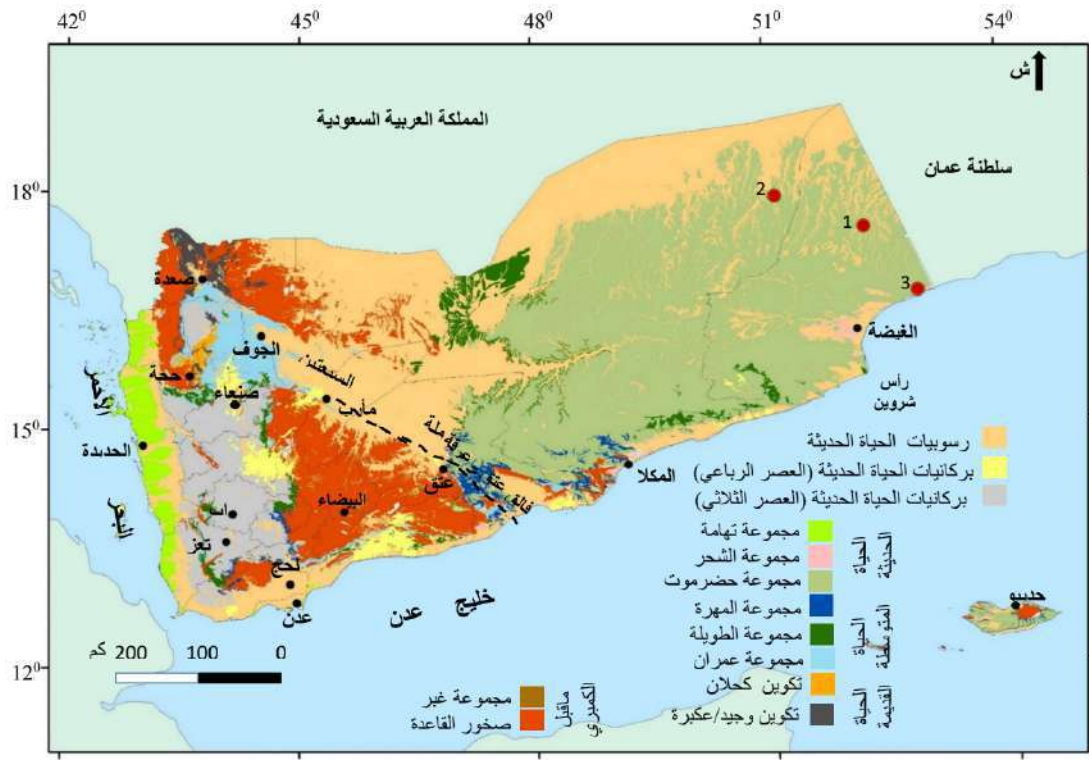


Figure 2 A Geological map of the Republic of Yemen. The red circles refer to the locations of the caves which were visited by the Omani Caves Explorations Team. 1: Khasfat tha Fujait. 2: Tayyeh Cave. 3: Askhanait Cave. (Source: Remote Sensing Center, 2010 and Al-Kharbush et al. 2022).

Khasfait Tha Fujait Cave

Khasfait tha Fujait Cave

Khasfait tha Fujait Cave, which is well known as 'Well of Barhout' in the desert of Al Mahara Governorate in the eastern part of the Republic of Yemen, is approximately 30 km from the Omani borders, at the coordinates of 653426 mE, 1917779 mN, Q 39. It is one of the holes or caves which has formed by the dissolution of limestone, such as those found in Dhofar Governorate in southern Oman, and the Governorates of Mahra and Hadramout in Yemen. The layers inside the well are subjected to continuous dissolution due to the interaction of ground and surface waters that contain acids and salts, forming huge pits and deep caves over millions of years.

The well is located on the route that leads to the Fugait area, branching off from the route that connects the cities of Shahan and Ghaydah in Al-Mahra Governorate. The alleged Well of Barhout is a prominent landmark that appears clearly from satellite images (Figure 3).

It is about 30 meters in diameter. It is located between small plains and mountains, most of which are made of limestones, and a group of small streams pour into it. According to the geological list of the Republic of Yemen, the well is part of the Habshiyah Formation dating to the Eocene Epoch. Over the centuries, stories and myths about the well have been told and retold among the Arab region, especially in the Arabian Gulf. Most of these myths describe it as a dwelling of the jinn. Other stories believe that it contains huge crocodiles, while some say it is where apostates and non-believers are tortured after death. Some believe that it contains massive rivers, and others believe that their heads would be severed once they're down there. However, according to the locals, the well was not explored or documented before the Omani team's visit in September of 2021. The team was unable to find any history of documentation of the well.

Khasfait Tha Fujait Cave

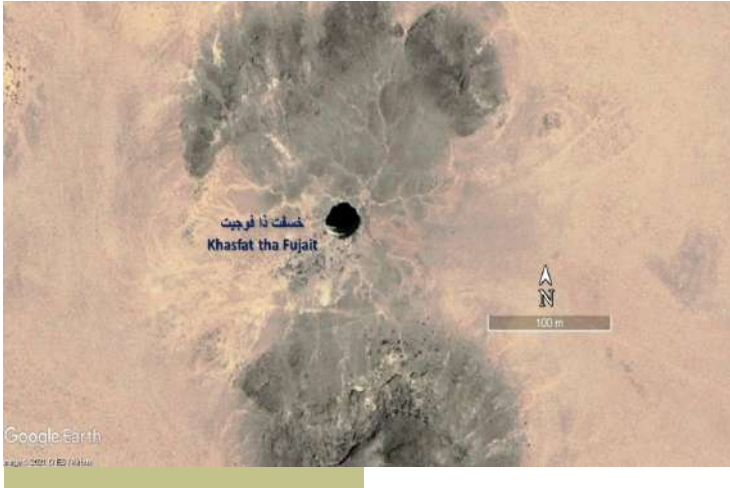


Figure 3: Khasfat tha Fujait well which is located near Fujait village in shahan district in Al Mahra Province. It is around 1 kilometer away from the street leading to the village. It has an eerily circular entrance that spans 30 m in diameter.

The depth of the well is 112m, and it is 30m in width at the surface. Deep inside, the cave expands to 116m in width. The bottom of the cave is inclined to the south at an angle of five degrees. The humidity of the southern and eastern parts of the cave is more than the other parts of the cave and its soil appears to be more muddy. Figure (4) is an aerial view showing the Well of Barhout taken by the team during the visit.

The hole diameter changes according to the resistance of the surrounding rocks to dissolution where the hole relatively large in less rigid rock layers. However, the surface and the bottom of the hole are both round. The hole contains many small cavities and sharp rocky ridges. At a depth of approximately 65m from the surface, water emerges from holes on the walls to form beautiful waterfalls which vary in the abundance and continuity of water.

Khasfait Tha Fujait Cave

Khasfait Tha Fujait Cave

The eastern waterfall is the most active one in which speleothems, stalagmites are deposited (Figure 5), while the flow of water from the southern waterfall is interrupted. However, the dripping water from a group of stalactites, which are located below the waterfalls, have formed different cave speleothems around them. The rocks of the mountain side in the center and the north of Al Mahra Province are leaning to the north as in Dhofar Mountains. It seems that the groundwater is also moving at the same inclination from the south to the north.



Figure 4: An aerial view of Khasfat tha Fujait well while the team is preparing to descend into the well. They use two basic ropes; One of which was tied between two cars facing each (the eastern and western sides of the cave). The picture also shows the locals gathering around the hole.

Khasfait Tha Fujait Cave

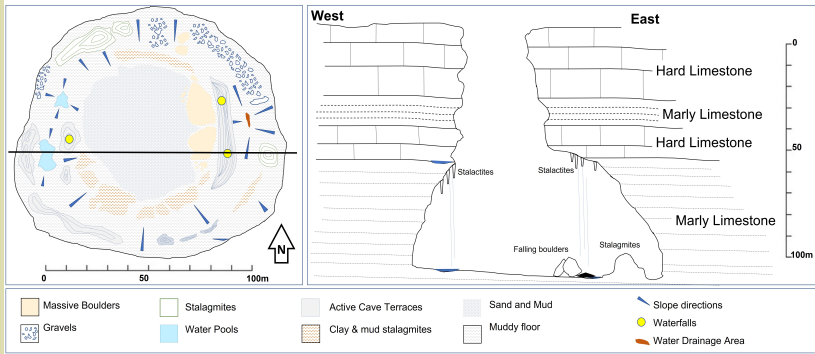


Figure 5: Schema of Khasfait the Fujait Cave according to the Survey from Omani Caves Explorations Team.



Figure 6: An overview of the west side of Khasfait tha Fujait where a small lake is located.

The Speleothems of Khasfait tha Fujait Cave

One of the most prominent speleothems in the cave is the stalactites that hang from the edges of the Cave's walls. These stalactites are concentrated from a depth of 60 meters to the bottom of the cave. It seems that it is the depth of the surface groundwater in the area where waterfalls flow from the layers of the rocks. However, Some of these stalactites are several meters long. It is concentrated in the form of rings that surround the cave at the level of some porous rocks beds from which water flows, and there are less than three main levels on the edges of the cave's walls where Annular stalactites appear on them (Figure7).

Large lime terraces are deposited below the active waterfalls, which appear specifically around the eastern side of the cave where waterfalls are constantly falling. These terraces contain pools and lime surfaces.



Figure 7: An overview of the East side of Khasfait tha Fujait where a 9- meter stalagmite is located.

The speleothems of Khasfait tha Fujait Cave

Cave pearls are one of the most beautiful lime speleothems found in Khasfat tha Fujait Cave. They are spherical lime speleothem with a smooth or rough surface. The size of these pearls ranges from the size of sand grains up to several centimeters. Often, these pearls are covered with green algae or red iron oxide speleothem, which makes it look in different beautiful colors (Figure 8). When cave pearls are immersed in shallow pools, their surfaces become smoother, more lustrous and less oxidized. It seems that the cave pearls in this cave were formed by less water in contrast to the active flow where lime terraces are deposited. Although it might be that the water flow is intermittent where cave pearls are located, their locations remain wet.

The analysis of Khasfait tha Fujait Cave pearls samples, which were done using X-ray diffractometry (XRD), indicates that these samples consist of pure lime.

The cross-sections and speleothems of these pearls indicate that they grew on detrital nuclei. Calcium carbonate rings are deposited around this nucleus over time. Because of the continuous rings rolling back and forth at their same pool with the water runoff and its fall from the stalactites, these rings of spherical shapes are formed (Figure 9A ,9B). The groundwater passes through the limestones in the cave layers and dissolves them into calcium carbonates that form these rocks. As a result, the water becomes saturated with these carbonates. When it falls from high altitudes to the bottom of the cave, calcium carbonates are gradually deposited and form new layers of cave pearls. The Khasfait tha Fujait Cave also contains a variety of stalagmites, some of which are made of clay while others are made of lime. Some stalagmites reach several meters high as in the eastern and northwestern sides of the cave. For example, the stalagmite in the eastern side of the cave is 9 meters high (Figure 7, 10,11).

Khasfait Tha Fujait Cave

The Speleothems of Khasfait tha Fujait

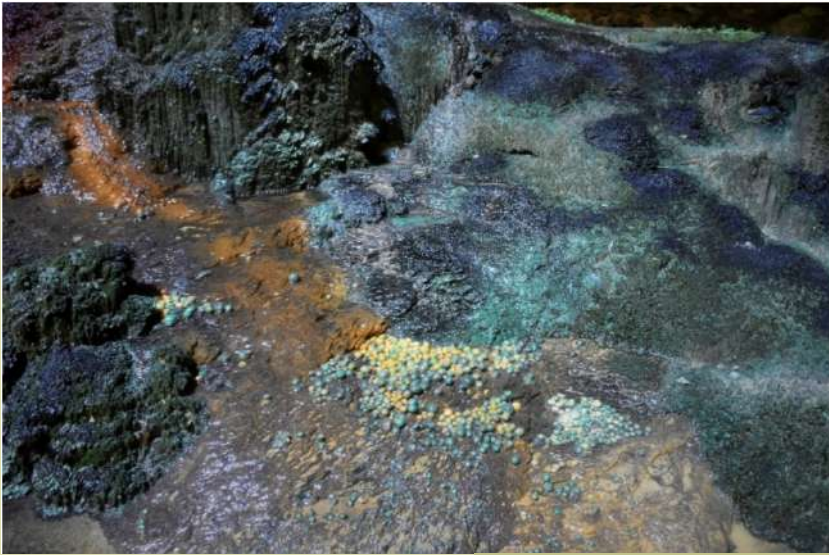


Figure 8: speleothems and Algae appear in different colors and cave pearls are clear down a slope where they congregate in shallow pools.



Figure 9A: Rings of pure lime in the cave pearls. There is a rock nucleus where pure lime rings were deposited. The diameter of this sample is approximately 3 cm.

The Speleothems of Khasfait tha Fujait

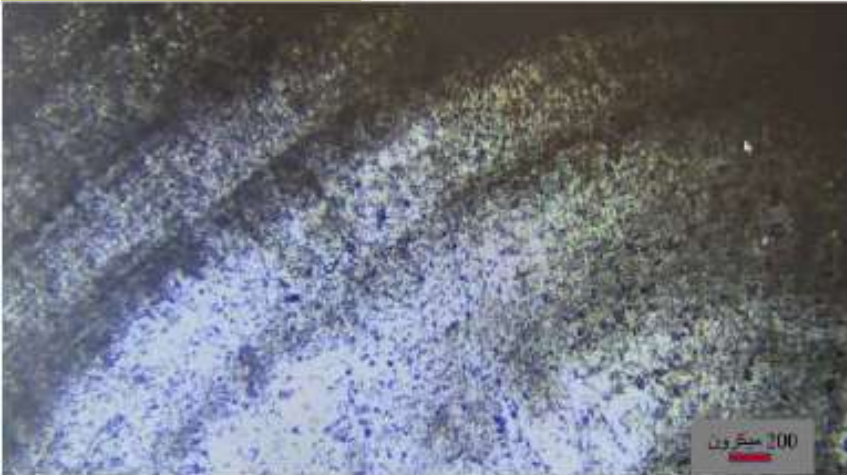


Figure9B:
Photomicrographs illustrating
the lime rings.



Figure 10: Cave speleothems
(limestone terraces, ridges
and pools) where their
depositions are active below
the waterfalls.

Khasfait Tha Fujait Cave

The Speleothems of Khasfait tha Fujait



Figure 11: Stalagmites, which are concentrated in the southern and eastern side of the cave, which are the wet sides of the cave. Stalagmites reach several centimeters high.

Organisms in Khasfait tha Fujait



Figure 12: A two meter snake inside Khasfait tha Fujait

Different types of animals live in the Khasfait tha Fujait, including birds such as pigeons and hawks which take the holes in the lime walls of the cave as nesting sites. These birds also benefit from trees that grow directly above the layer where the waterfalls flow at a depth of 60 meters deep from the surface of the cave. There are also snakes, beetles, frogs, small lizards and various types of ants at the cave's bottom (figure 12,13,14). There are also algae and fungi at the bottom of the cave in its damp walls (figure 8, 10)



Figure 13: One of the car tires at the bottom of the cave. Over the years it formed a trap for beetles that got into the middle of the car tire and could not get out of it.

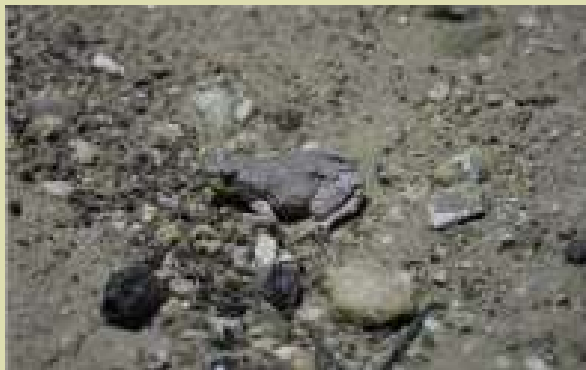


Figure 14: A frog that lives in the cave.

Descent into the Khasfait tha Fujait Cave

Nabil Al-Saqri and Nasser Al-Riyami prepared the descent system. It included a rope tied to two cars which were parking in the eastern and western sides of the cave. The rope wasn't touching the rocks surrounding the well. The rope was the main pillar on which two other ropes (white rope and green rope) were hung. One of them was used for the descent and the other one was a safety rope in case of any emergency (figure 15).



Figure 15: Arranging the ropes for the descent into the cave, the white rope was used for safety whereas, the green rope that appeared to the right of the picture was used to descent.



Figure 16: Nabil Al-Saqri while preparing the ropes for the descent into the cave.



Figure 17: Preparing the tools before the descent into the cave.

The Tourism development of Khasfait tha Fujait Cave

Khasfait tha Fujait Cave is one of the most prominent geological landmarks for tourists in Al-Mahra Province, Yemen. It also provides a distinctive ecosystem for many animals. There is no doubt that the cave will be a scientific and tourism destination for many scientists and amateurs in the future. It is necessary to protect and promote this heritage. Previously, the cave was used to get rid of waste, as many caves in the world. The team found a huge amount of medical waste in the cave such as injections, bandages, waterings and pills. There is also solid waste such as car tires (Figure 13), iron and wood. The fell is in the middle area of the cave which is covered with dirt and mud.

It is important that the official authorities in the Republic of Yemen, represented by the Local Council in the Al Mahra Province, ban throwing waste inside the well to protect its ecosystem. It is also necessary to hire a keeper from the locals who lives in the area around the cave to prevent any attempts of descent into the cave without having an official permission. This will protect its ecosystem from being sabotaged or collecting its speleothems without organization or having a scientific objective. Majlis Al-Jinn Cave in Oman represents an experience that could be replicated in Khasfat tha Fujait Cave. The Omani authorities organized permits to visit the cave and hired a keeper who lives in a village around the cave.

It is hoped that some Tourist adventure teams will be established in Yemen in cooperation with the official authorities to encourage and organize descent into the cave. Also, ensure the protection of its ecosystem and nature from being sabotaged.

The official authorities must establish Awareness campaign for locals and visitors about the importance of protecting natural phenomena including caves and wells. In addition, making a campaign to clean inside the cave from the waste because they affect negatively on the cave ecosystem in the short and the long term.

Acknowledgments

The Omani Caves Exploration Team thanks all Yemeni official authorities and residents of cities and villages who cooperated with the team during its stay in the Republic of Yemen, as they overwhelmed the team members with their good manners and great generosity. The team's visit to the Republic of Yemen lasted for four days, and the team crossed the Omani-Yemeni border through the Al-Mazyunah-Shahan land port in the afternoon on Tuesday, September 2021 ,14, and left Yemen from the Hawf-Sarfayt land port, at noon on Friday, September 2021 ,17.



Visiting the deputy governor's house.



Visiting the house of the director of the Shahan Directorate.



Visiting Musllam Al-Mahri's house in the village of Fujait.

Khasfait Tha Fujait Cave

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Khasfait Tha Fujait Cave

The Khasfait Tha Fujait Cave, whose name has always been associated with many ancient tales and legends that spread among Arab society, especially the Arabian Peninsula, is located in the Al-Mahra Governorate, east of the Republic of Yemen, approximately 33 km away from the southern borders of the Sultanate of Oman, and according to the narration of the local residents, the hole was not explored or documented before the visit of the Omani Caves Exploration Team to it in September of 2021, and the team generally did not find previous scientific documentation of the cave before. The cave contains various formations of mud and calsite stalagmites, not to mention that it also contains a group of living fungal creatures such as snakes, birds, frogs and small lizards.