

Investigated archeological sites from the Ubaid period (c. 7000 years B.P.) are located in the Bahra area, north of Kuwait Bay, which has the natural geomorphologic configuration preferred for ancient settlement. The origin of recent geomorphology was studied during geological and geomorphological field works, carried out by the Kuwait-Polish Archeological Mission (KPAM) and earlier by a Kuwaiti-British archeological mission. The base geological study and mapping were carried out in the past by Kuwait geologist. The location of the geological and geomorphological study comprises an area of the alluvial and coastal plain surrounded from the north-west and north-east by distinct, natural escarpment (Jal Az-Zor) and by the Kuwait Bay coastline from the south.

The Jal Az-Zor escarpment and rocks of the coastal plain area are composed of bedded fossiliferous sandstones, conglomerates, limestones and mudstones representing the time interval from the Neogene to Pleistocene. The escarpments in the study area, delimit northern Kuwait plateau, reach approximately 80–90 m above sea level. The origin of those escarpments is still disputed, but a tectonic model of margin of extensive plateau tilted northward with subsequent backward erosion is the most preferred hypothesis. The southern face of the escarpment is subdivided, in some places, by three or four terraces of fluvial/marine origin (Al-Asfour 1982), which descend in stepwise mode to the coastal plain below. The origin of these terraces can also be considered as the result of selective erosion, without influence of former marine coastal zones.

The coastal plain consists of (landward from the sea): sandy bars and channels of tidal zone, sandy – muddy beaches, coastal *sabkha* deposits, gradually passing northward into sandy desert plain composed of dunes, sand sheets, flood and temporary ponds' deposits, towards distal alluvial fan slopes spaced along escarpments. On the coastal and alluvial plain, in many cases, firm bedrocks are exposed as distinct erosive forms, composed of well-bedded red and yellowish quartzite sandstones of marine origin. These sandstones are capped by a gravel-sand beach-rock deposit. The archeological site H3 is located on a promontory close to the sea coast, directly on older bedrock deposits or fossilized beach-rocks.

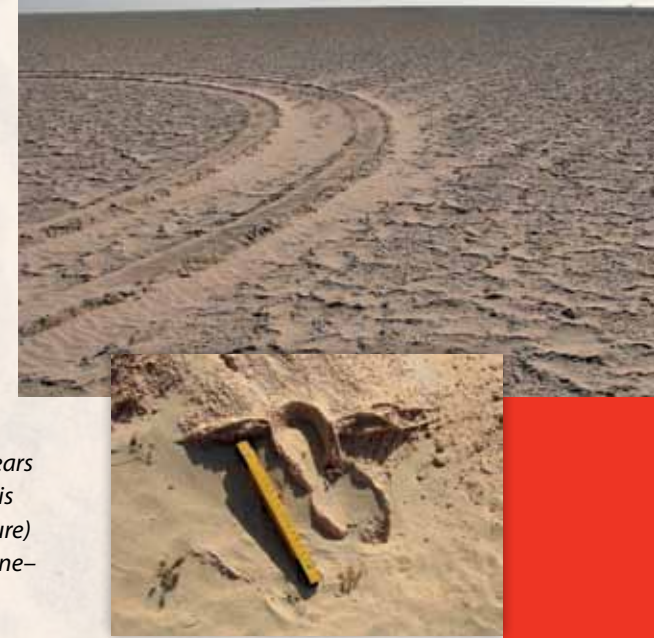


Towards the north, on the desert surface, there are several well exposed, large erosional forms created from cemented aeolian sandstones, probably Early? Neogene in age. The Bahra 1 archeological site is located directly on former active dune field and the building material used for construction of the settlement's houses came directly from

*Gorge (wadi) originated due to recent strong erosion in the Jal Az-Zor escarpment zone. Exposed rocks represent Neogene (Kuwait Group) and Pleistocene deposits. The gorge is open on the Kuwait Bay in the south. Such topography probably existed in the more humid climate of the Ubaid period.*

*In contrast to the Jal Az-Zor escarpments, flat coastal sabkha is spread along the Kuwait Bay margin. This sabkha type is specific for northern Kuwait due to the influence of rich abundance of siliclastic deposits from the Khor As-Sabiyah estuary. The pattern of regular polygons and small adhesion warts exposed on the sabkha surface originated due to drying processes on the muddy surface and growth of gypsum crystals. Sabkha is also covered by aeolian sand, forming visible sand strips in accordance with prevailing wind direction.*

*For archeologists and many others, at first glance, this appears to be a fossilized shoe imprint from ancient times. In fact, it is part of a shallow-marine trace fossil (left by a marine creature) preserved in sandstone of probable Early Neogene (Oligocene–Lower Miocene) date, now exposed on the surface due to weathering processes.*



adjacent outcrops within aeolian sandstones. Other archeological sites (such as tumuli graves) are located at the tops of escarpments capped in many places by a gravel blanket. Recently, accretion and erosion of Holocene deposits occurring in the study area facilitate, in some instances, the natural exposure of archeological sites or, inversely, cover them, as is for example the case with the wells excavated by the KPAM.



*Aeolian sandstones exposed in many places on the investigated area on faces and slopes of eroded hills and scarps. Note the significant dune sets, showing parts of dune slopes. These aeolian rocks are probably Early? Neogene in age.*