Digging in ancient ruins and searching for sherds of pottery – that’s what most people have in mind when they think of archaeology. But today’s antiquarians use up-to-the-minute technology. Field research in archaeology now employs scientific prospecting, surveying and documentation techniques, including satellite-based imaging. Archaeologist Michael Mackensen’s LMUexcellent project gives a good example of the toolkit modern excavators can call upon. Mackensen is investigating a Roman military fort at a remote oasis in the Libyan desert. The “excavation is no picnic, but there are – often surprising – rewards.”

The scene is set in the middle of nowhere. What went on here will probably never be fully understood, but perhaps one can reconstruct, in rough outline, what life was like here then. Few people would choose to spend time in such an inhospitable spot, but when Michael Mackensen talks about his investigations here – well off the beaten track – his eyes light up. No, Mackensen is not a criminologist, he is Professor of Archaeology of the Roman Provinces at LMU. And as the director of a research network combining various sciences and archaeology, he has been studying the Roman fort at Gheriat el-Gharbia, an oasis on the edge of the rocky Libyan desert named Hamada al-Hamra. In the third century AD, this outpost was part of a defensive line, the *limes Tripolitanus*, on the southern boundary of the Roman Empire. In choosing this site for his LMUexcellent project, Mackensen too was crossing a frontier into uncertain territory. “German archaeologists have never undertaken any field projects so far inland in Libya“, he says. And no one had ever done any controlled excavations at the Roman fort of Gheriat el-Garbia. The last archaeologists to visit the oasis – the members of an English team who were here in 1981 – simply surveyed the Roman ruins and the later structures erected within the walls of the fort by Arabs and Ottomans. In general, little is known about the size and structure of the fortifications that were constructed along the *limes Tripolitanus*, but we do know when the fort at Gheriat el-Garbia was built. A fragment of a building inscription commemorating its completion, published in 1966, informs us that construction work ended in 201 AD. Whether or not a settlement ex-
isted here in the late Roman period was unknown, as was the origin and fate of the Berber village that was abandoned in the 1950s. Its remains can still be seen within the perimeter of the fort. The comparative neglect of the fort by archaeologists seems surprising. After all, the military bases situated along the limes Tripolitanus are well preserved, and inscriptions can tell us much about the purpose of the various fortified sites, and the organization and function of the limes as the military and commercial frontier of the Empire, and a contact zone with the indigenous tribes. For Michael Mackensen the reasons for this neglect lie in the difficult working conditions on site. "Temperatures can reach more than 50 degrees, there are sandstorms and parasites to contend with, and the place is far from any basic infrastructure, including medical facilities. Field research in such a remote location is very taxing, and involves risks and privations for the whole team." An archaeological adventure certainly, but one that other antiquarians have not cared to undertake.

**RESIDENCE OF A REGIONAL COMMANDER**

The fort in the oasis of Gheriat el-Garbia was established in the region known to the Romans as Tripolitania, in Northwestern Libya, during the reign of the Emperor Septimius Severus. Under Roman rule, the coastal cities of the region experienced an economic boom. This prosperity was largely due to two factors. In the countryside immediately inland, farming was possible without the need for complex irrigation systems, and agricultural productivity was high. In addition, the cities on the sea-coast were located at the northern end of trans-Saharan trade routes. The fort at Gheriat el-Garbia covers an area of 2.25 hectares. This, and the imposing nature of its main gate – the walls of which stand up to 10 meters high even today – suggest that the fort was the residence of a regional commander of the Roman frontier in the third century AD. Where did they come from, the troops who served here on the edge of the stony desert, enduring the blazing summer heat and the biting winter cold? What were their duties, and how did they spend their time? What did they live on? What religious ceremonies did they celebrate? These are a few of the questions that Michael Mackensen, with the help of an interdisciplinary team of experts, has tried to answer in the course of two 6-week campaigns in the spring of 2009 and 2010. “Archaeology is no longer simply a matter of looking for potsherds and the foundations of ancient buildings, and then interpreting the finds. Modern archaeological research on the cultures of the Ancient World is methodologically complex, and utilizes the latest scientific methods in prospecting, surveying and documentation – even satellite imaging – in order to arrive at precise conclusions”, explains Mackensen. Indeed, when he lists the techniques used to explore the fort and the surrounding terrain – geodesy, photogrammetry, TerraSar-X, georadar and geomagnetics – it all sounds more like science fiction than an archaeological expedition. For his LMUexcellent project, Mackensen succeeded in bringing together a team that includes experts from a variety of institutions in Germany and abroad. He took advantage of their know-how to document the site at Gheriat el-Garbia and to plan the excavations. He is particularly proud of the fact that he was able to press the Earth-monitoring satellite TerraSAR-X into service for archaeological purposes. Every time TerraSAR-X flew over
Gheriat el-Garbia, it transmitted radar data covering an area of 15x15 km around the site to the ground station at the German Aerospace Center (DLR) in Oberpfaffenhofen. These data served as the basis for detailed geodetical work on the ground, which would later result in a high-resolution, three-dimensional digital elevation model of the landscape.

To carry out an archaeological research project in Libya, one needs not only extremely good contacts with the local authorities, one must also bring along a great deal of patience, sensitivity and understanding of Libyan culture. Before the LMU excellent project had taken its final shape, Michael Mackensen entered into consultations with the Libyan Department of Archaeology in Tripoli and invited leading staff members to visit Munich and Vienna. “The hospitality we had been able to extend to our Libyan hosts prior to the first excavation season was very helpful in ensuring that the authorities there would give us their full support. Their assistance during the complicated negotiations with Customs officials regarding the temporary import of measuring instruments was invaluable. They also helped us to recruit local workers, purchase equipment and supplies, and arrange for transportation to the site in the desert”, he says. Professor Mackensen is especially grateful for the support he received from administrative personnel at LMU during the organizational phase of the project. “Without their readiness to help and their efficiency, the project would not have been implemented in Libya.”

Finally, after months of preparation, the whodunit in the desert began, in the spring of 2009. The first priority was a survey of the terrain for surface finds. In the area surrounding the fort, the slopes below it and their immediate foreland, the team collected more than 1300 fragments of fine red slip tableware (sigillata) and kitchenware as well as amphorae. Most of the finds can be dated to the 3rd century, but quite unexpectedly the team also found
material from the second half of the 4th and the 5th century. Meanwhile, more than 100 pottery samples have been subjected to detailed chemical analysis. The results permitted the pottery specialists to identify two new sigillata production centers in Tripolitania, and shed light on the origins of the rest of the pottery. The garrison apparently obtained its crockery from workshops on the coast and on the plateau of Gebel Garrian, but some also came from Central Tunisia. Olive oil for the Roman soldiers who manned the fort arrived at Gheriat in Tripolitanian and Tunisian amphorae. – But why did the Roman military surveyors select this remote site for a fort in the first place? The strongpoint is situated on a steep-sided promontory that overlooks the oasis, and is surrounded by deeply eroded valleys. Only the approach from the Northeast, where the triple-arched main gate was constructed, is more easily accessible. In order to obtain a clearer picture of the geomorphology, and the topographical situation of the fort overlooking the valley bottom, specialists in photogrammetry and remote sensing from the Technische Universität München constructed a topographical map and a three-dimensional digital elevation model of the terrain. In addition, the remains of the curtain wall of the fort – which reaches a height of 10 meters in some places – were surveyed, together with its interval and corner towers as well as the four gates. A new digital plan was drawn. The plateau falls away steeply on three sides, and the access tracks from the Southwest and East had not previously been localized. But the research team was able to identify these based on traces of ruts in the rock. Moreover, they found a ramp 180 meters long, which led up from the dry bottom of the wadi, and provided access to the main gate for horses and mules or other beasts of burden such as camels. Nearby, Michael Mackensen was also able to locate the quarries that provided the stone used to build the fort.

USING MAGNETOMETRY AND GEORADAR TO SURVEY THE FORT

Of course, much of what interests archaeologists lies buried below the surface of the ground. Clearly, it would be impractical to excavate the entire area of a complex as large as the fort at Gheriat el-Garbia. How then does one choose where to dig? Here again, technology comes to the rescue. Experts from the Center for Meteorology and Geodynamics in Vienna used magnetometry and georadar to survey the fort and its northeastern vicinity, the south slope and areas beyond the oasis itself. “These data give us clues as to where buried foundations lie, and where it might be worthwhile to take a closer look or to dig”, explains Michael Mackensen. The team hoped to locate traces of the buildings that had stood within the fort – such as the living quarters in which the garrison was housed – and to map the streets. However, in the area where they expected the barracks to be located, no indications of buildings dating from Roman times were found within a meter beneath the surface. “Roman forts were built to a standard plan, and the layout of the buildings normally followed a stereotyped pattern. At Gheriat el-Garbia, the area where the headquarters building and the commanding officer’s house must have stood, is now a large plaza, which is surrounded by a mosque, dwellings and storehouses that were part of the Berber settlement”, says Mackensen. Underneath these houses, the excavators were able to locate the foundations of the central shrine, where the legion’s standards were kept and images of the Emperors
were displayed and worshipped. As the expedition leader explains, “The problem is that, in the 17th or the 18th century, the indigenous population built a large settlement within the walls of the fort, and used stones from the ancient ruins to build their houses. That is why there is very little left of the Roman structures.” Although few material traces could be found of buildings dating from the early 3rd century – when the fort was constructed – the excavators soon got over this disappointment. They discovered instead two massive walls that had been part of a Roman building datable to the 4th or 5th century. “Unfortunately, we have not yet been able to define the size or the function of this centrally placed building”, says Michael Mackensen. Pottery found immediately below the base of the walls has been dated, however, and the dates support the existence of a late Roman settlement at Gheriat el-Garbia. The team also carried out detailed studies of the occupation layers in the vicinity of the main gate, and characterized the various occupation phases and the structures associated with them. It turned out that the main gate was deliberately blocked at a later date and, here too, the excavators found traces of occupation dating from the period from the mid 4th to the 5th century. Among the most important finds were several inscriptions. One of these was carved on the plinth of a full-length statue of the Empress Iulia Mamaea, which was re-used in the blocking of the carriageway of the main gate.

Among the most important finds were several inscriptions. One of these was carved on the plinth of a full-length statue of the Empress Iulia Mamaea, which was re-used in the blocking of the carriageway of the main gate. The inscription could be reconstructed in its entirety, and revealed that the fort at Gheriat el-Garbia was manned until the year 238 AD by a detachment (vexillatio) of the legio III Augusta, based in Lambaesis in Eastern Algeria. The ancient name of the fort of Gheriat is also mentioned: Myd[---].

Ruins of houses, potsherds and amphorae – most of the material archaeologists turn into data was once carelessly thrown away by its owners. And antique rubbish dumps contain more than the pots people cooked in and the dishes they ate from. They can also tell about the food they were eating. Indeed, at Gheriat el-Garbia, Mackensen’s team found evidence that allowed them to identify what food the garrisons were provided with. In the middens of Late Antiquity, they found grains of wheat and barley, but also almonds and dates, and the seeds of pomegranates, figs, grapes, olives, capers, pistachios and wild watermelons. “Most
of these fruits do not grow in the region around Gheriat el-Garbia, so we must assume that the bulk of the food for the garrison of approximately 500-800 men had to be brought in across the desert”, says Mackensen. Meat was also on the menu, albeit in smaller amounts, as indicated by the bones of cattle, sheep, pigs, goats, chickens and camels found on the site. Cutmarks on the bones prove that the Roman troops stationed here did in fact eat the meat of these species. The variety of wild species identified in the Roman garbage heaps is also surprising. Several species of gazelle, as well as ostriches, were apparently hunted by the people living in Gheriat el-Garbia in the 4th and 5th centuries. But this was not all. The team was astonished to discover – in the middle of a stony waste, 300 km from the coast – a vertebra that once belonged to a marine animal, most probably a shark. Presumably caught in the Mediterranean, the shark meat apparently reached the oasis, probably packed and preserved in wet straw. At any rate, telltale cutmarks suggest that it ended up as the centerpiece of a late Roman banquet, far from its watery home.

Translated by Paul Hardy

Prof. Dr. Michael Mackensen became Professor of Archaeology of the Roman Provinces at LMU in 1994. He is a member of numerous archaeological associations and was elected a Fellow of the Society of Antiquaries of London in 2009.

www.vfp-archaeologie.uni-muenchen.de/personen/professoren/mackensen
M.Mackensen@vfpa.fak12.uni-muenchen.de