



# The 7<sup>th</sup> International Scientific Agricultural Conference

## Conference Field Tour Wednesday 10 October 2012

**8:30 am - 19:30 pm     Field Tour to Some Agricultural Farms and Historic Places.**

- 8:30     Departure from hotels in Irbid
- 09:15   Arrival Umm Qais historic place
- 11:00   Departure
- 12:00   Arrival Eng. Kamal Sari Orchard, Middle Jordan Valley
- 13:00   Departure
- 14:30   Lunch at the University of Jordan Experimental Farm, Middle Jordan Valley
- 15:30   Departure
- 16:30   Arrival Dead Sea Panorama
- 19:30   Departure to Irbid



### Umm Qais

#### **Gadara (Ancient Greek)**

Umm Qais is a town in northern Jordan near the site of the ancient town of Gadara. It is situated in the extreme north-west of the country, where the borders of Jordan, Israel and Syria meet, perched on a hilltop (378 metres above sea level), overlooking the sea of Tiberias, the Golan heights and the Yarmuk gorge. Umm Qais is in Jordan's Irbid Governorate. The Hellenistic-Roman town of Gadara was also sometimes called Antiochia or Antiochia Semiramis (Ancient Greek: Seleucia.)

#### **History of Gadara**

The town is situated on a ridge, which falls gently to the east but steeply on its other three sides, so that it was always potentially of strategic importance. By the third century BC the town was of some cultural importance. It was the birthplace of the satirist Menippos, a slave who became a Cynic philosopher and satirised the follies of mankind in a mixture of prose and verse. His works have not survived, but were imitated by Varro and by Lucian. The Greek historian Polybius describes Gadara as being in 218 BC the 'strongest of all places in the region'. Nevertheless it capitulated shortly afterwards when besieged by the



Seleucid king Antiochus III of Syria. The region passed in and out of the control of the Seleucid kings of Syria and the Ptolemies of Egypt.

In 167 BC the Jews of Jerusalem rebelled against the Seleucids, and in the ensuing conflict in the region Gadara and other cities suffered severe damage. In the early first century BC Gadara gave birth to its most famous son, Meleager. He was one of the most admired Hellenistic Greek poets, not only for his own works but also for his anthology of other poets, which formed the basis of the large collection known as the Greek Anthology. In 63 BC, when the Roman general Pompey placed the region under Roman control, he rebuilt Gadara and made it one of the semi-autonomous cities of the Roman Decapolis, and a bulwark against Nabataean expansion. But in 30 BC the Roman emperor Augustus placed it under the control of the Jewish king Herod. The historian Josephus relates that after King Herod's death in 4 BC Gadara was made part of the Roman province of Syria.



In the first century AD Jesus drove demons out of a man into swine 'in the country of the Gadarenes' (Gospel According to Matthew; the Gospels According to Mark and Luke read 'country of the Gerasenes'). Josephus relates that in AD 66 at the beginning of the Jewish revolt against the Romans the country around Gadara was laid waste" So Vespasian marched to the city of Gadara. He came into it and slew all the youth, the Romans having no mercy on any age whatsoever. He set fire to the city and all the villas around it". The Gadarenes captured some of the boldest of the Jews, of whom several were put to death and others imprisoned. Some in the town surrendered to Emperor Vespasian, who placed a garrison there.

The 2nd century AD Roman aqueduct to Gadara supplied drinking water through a qanat 170 km long. Its longest underground section, running for 94 km, is the longest known tunnel from ancient times. Gadara continued to be an important town within the Eastern Roman Empire, and was long the seat of a Christian bishop. With the conquest of the Arabs, following the Battle of Yarmouk in 636 it came under Muslim rule. Around 747 it was largely destroyed by an earthquake, and was abandoned.

## Dead Sea



The **Dead Sea** "The Sea of Death"), also called the **Salt Sea**, is a salt lake bordering Jordan to the east and Israel and the to the west. Its surface and shores are 423 metres (1,388 ft) below sea level, Earth's lowest elevation on land. The Dead Sea is 377 m (1,237 ft) deep, the deepest hypersaline lake in the world. With 33.7% salinity, it is also one of the world's saltiest bodies of water, though Lake Assal (Djibouti), Garabogazköl and some hypersaline lakes of the McMurdo Dry Valleys in Antarctica (such as Don Juan Pond) have reported higher salinities. It is 8.6 times saltier than the ocean.<sup>1</sup> This salinity makes for a harsh environment in which animals cannot flourish, hence its name. The Dead Sea is 67 kilometres (42 mi) long

and 18 kilometres (11 mi) wide at its widest point. It lies in the Jordan Rift Valley, and its main tributary is the Jordan River. The Dead Sea has attracted visitors from around the Mediterranean basin for thousands of years. Biblically, it was a place of refuge for King David. It was one of the world's first health resorts (for Herod the Great), and it has been the supplier of a wide variety of products, from balms for Egyptian mummification to potash for fertilizers. People also use the salt and the minerals from the Dead Sea to create cosmetics and herbal sachets. In 2009, 1.2 million foreign tourists visited on the Israeli side. The Dead Sea seawater has a density of 1.240 kg/L, which makes swimming similar to floating

## Geography

The Dead Sea is an endorheic lake located in the Jordan Rift Valley, a geographic feature formed by the Dead Sea Transform (DST). This left lateral-moving transform fault lies along the tectonic plate boundary between the African Plate and the Arabian Plate. It runs between the East Anatolian Fault zone in Turkey and the northern end of the Red Sea Rift offshore of the southern tip of Sinai. The Jordan River is the only major water source flowing into the Dead Sea, although there are small perennial springs under and around the Dead Sea, creating pools and quicksand pits along the edges.<sup>[9]</sup> There are no outlet streams. Rainfall is scarcely 100 mm (4 in) per year in the northern part of the Dead Sea and barely 50 mm (2 in) in the southern part. The Dead Sea zone's aridity is due to the rainshadow effect of the Judean Hills. The highlands east of the Dead Sea receive more rainfall than the Dead Sea itself. To the west of the Dead Sea, the Judean Hills rise less steeply and are much lower than the mountains to the east. Along the southwestern side of the lake is a 210 m (700 ft) tall halite formation called "Mount Sodom".



## Natural history

There are two contending hypotheses about the origin of the low elevation of the Dead Sea. The older hypothesis is that it lies in a true rift zone, an extension of the Red Sea Rift, or even of the Great Rift Valley of eastern Africa. A more recent hypothesis is that the Dead Sea basin is a consequence of a "step-over" discontinuity along the Dead Sea Transform, creating an extension of the crust with consequent subsidence. Around three million years ago, what is now the valley of the Jordan River, Dead Sea, and Wadi Arabah was repeatedly inundated by waters from the Mediterranean Sea. The waters formed in a narrow, crooked bay which was connected to the sea through what is now the Jezreel Valley. The floods of the valley came and went depending on long scale climate change. The lake that occupied the Dead Sea Rift, named "Lake Sedom", deposited beds of salt that eventually became 3 km (2 mi) thick. Near Ein Gedi, salt builds up along the shores of the Dead Sea. Pebbles cemented with halite on the western shore of the Dead Sea near Ein Gedi.

Approximately two million years ago, the land between the Rift Valley and the Mediterranean Sea rose to such an extent that the ocean could no longer flood the area. Thus, the long bay became a lake. The first such prehistoric lake is named "Lake Amora", which was a freshwater or brackish lake that extended at least 80 km (50 mi) south of the current southern end of the Dead Sea and 100 km (60 mi) north, well above

the present Hula Depression. As the climate became more arid, Lake Amora shrank and became saltier. The large, saltwater predecessor of the Dead Sea is called "Lake Lisan."

In prehistoric times, great amounts of sediment collected on the floor of Lake Amora. The sediment was heavier than the salt deposits and squeezed the salt deposits upwards into what are now the Lisan Peninsula and Mount Sodom (on the southwest side of the lake). Geologists explain the effect in terms of a bucket of mud into which a large flat stone is placed, forcing the mud to creep up the sides of the pail. When the floor of the Dead Sea dropped further due to tectonic forces, the salt mounts of Lisan and Mount Sodom stayed in place as high cliffs. (see salt domes)

From 70,000 to 12,000 years ago, the lake level was 100 m (330 ft) to 250 m (820 ft) higher than its current level. This lake, called "Lake Lisan", fluctuated dramatically, rising to its highest level around 26,000 years ago, indicating a very wet climate in the Near East. Around 10,000 years ago, the lake level dropped dramatically, probably to levels even lower than today. During the last several thousand years, the lake has fluctuated approximately 400 m (1,300 ft), with some significant drops and rises. Current theories as to the cause of this dramatic drop in levels rule out volcanic activity; therefore, it may have been a seismic event.



## Chemistry

Halite deposits (and teepee structure) along the western Dead Sea coast. Beach pebbles made of halite; western Dead Sea coast. Until the winter of 1978-79, when a major mixing event took place, the Dead Sea was composed of two stratified layers of water that differed in temperature, density, age, and salinity. The topmost 35 metres (115 ft) or so of the Dead Sea had a salinity that ranged between 300 and 400 parts per thousand and a temperature that swung between 19 °C (66 °F) and 37 °C (99 °F). Underneath a zone of transition, the lowest level of the Dead Sea had waters of a consistent 22 °C (72 °F) temperature and complete saturation of sodium chloride (NaCl). Since the water near the bottom is saturated, the salt precipitates out of solution onto the sea floor. Beginning in the 1960s, water inflow to the Dead Sea from the Jordan River was reduced as a result of large-scale irrigation and generally low rainfall. By 1975, the upper water layer was saltier than the lower layer. Nevertheless, the upper layer remained suspended above the lower layer because its waters were warmer and thus less dense. When the upper layer cooled so its density was greater than the lower layer, the waters mixed (1978–79). For the first time in centuries, the lake was a homogeneous body of water. Since then, stratification has begun to redevelop.

The mineral content of the Dead Sea is very different from that of ocean water. The exact composition of the Dead Sea water varies mainly with season, depth and temperature. In the early 1980s, the concentration of ionic species (in g/kg) of Dead Sea surface water was  $\text{Cl}^-$  (181.4),  $\text{Br}^-$  (4.2),  $\text{SO}_4^{2-}$  (0.4),  $\text{HCO}_3^-$  (0.2),  $\text{Ca}^{2+}$  (14.1),  $\text{Na}^+$  (32.5),  $\text{K}^+$  (6.2) and  $\text{Mg}^{2+}$  (35.2). The total salinity was 276 g/kg. These results

show that the composition of the salt, as anhydrous chlorides on a weight percentage basis, was calcium chloride ( $\text{CaCl}_2$ ) 14.4%, potassium chloride ( $\text{KCl}$ ) 4.4%, magnesium chloride ( $\text{MgCl}_2$ ) 50.8% and sodium chloride (common salt,  $\text{NaCl}$ ) 30.4%. In comparison, the salt in the water of most oceans and seas is approximately 97% sodium chloride. The concentration of sulfate ions ( $\text{SO}_4^{2-}$ ) is very low, and the concentration of bromide ions ( $\text{Br}^-$ ) is the highest of all waters on Earth. The salt concentration of the Dead Sea fluctuates around 31.5%. This is unusually high and results in a nominal density of 1.24 kg/l. Anyone can easily float in the Dead Sea because of natural buoyancy. In this respect the Dead Sea is similar to the Great Salt Lake in Utah in the United States. An unusual feature of the Dead Sea is its discharge of asphalt. From deep seeps, the Dead Sea constantly spits up small pebbles and blocks of the black substance. Asphalt coated figurines and bitumen coated Neolithic skulls from archaeological sites have been found. Egyptian mummification processes used asphalt imported from the Dead Sea region.

### **Health effects and therapies**

The Dead Sea area has become a major center for health research and treatment for several reasons. The mineral content of the water, the very low content of pollens and other allergens in the atmosphere, the reduced ultraviolet component of solar radiation, and the higher atmospheric pressure at this great depth each have specific health effects. For example, persons experiencing reduced respiratory function from diseases such as cystic fibrosis seem to benefit from the increased atmospheric pressure. The region's climate and low elevation have made it a popular center for several types of therapies:

- **Climatotherapy:** Treatment which exploits local climatic features such as temperature, humidity, sunshine, barometric pressure and special atmospheric constituents
- **Heliotherapy:** Treatment that exploits the biological effects of the sun's radiation
- **Thalassotherapy:** Treatment that exploits bathing in Dead Sea water

### **Treatment for psoriasis:**

Climatotherapy at the Dead Sea is an effective therapy for patients with psoriasis, who benefit from sunbathing for long periods in the area due to its position below sea level and subsequent result that many of the sun's harmful UV rays are reduced.

### **Treatment for rhinosinusitis:**

Rhinosinusitis patients receiving Dead Sea saline nasal irrigation exhibited significantly better symptom relief compared to standard hypertonic saline spray. Treatment for osteoarthritis: Dead Sea Mud pack therapy has been suggested to temporarily relieve pain in patients with osteoarthritis of the knees. According to researchers of the Ben Gurion University of the Negev, treatment with mineral-rich mud compresses can be used to augment conventional medical therapy in these patients.

