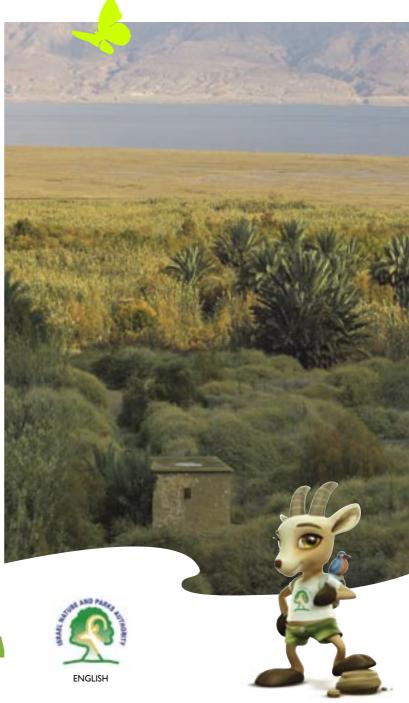
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# **Enot Tsukim**

# **Nature Reserve**



### Visit to the Hidden Reserve

You can visit this closed part of the reserve with a reserve guide. A visit here is an exciting encounter with a unique place: You will find flowing streams, natural pools, canyons digging into the clayey beach, bands of vegetation at the water's edge, fish, snails, insects and more.

### **Guided Visits to the Hidden Reserve**

Friday: 10:00 and noon

Saturday: 10:00, noon, and 14:00

Holidays: every hour on the hour, beginning at 10:00. For details, phone: 02-9942355; Fax: 02-9947815 Mid-week guided tours for groups are by reservation only.



In the Hidden Reserve

(Photo: Doron Nissim)

### Please obey the following rules:

- Access to the Dead Sea is prohibited.
- Do not climb the banks.
- Use only marked trails.
- Children are allowed in the wading pools only with an adult. No swimming in the lakes.
- Do not harm flora, fauna or inanimate objects. Fishing is prohibited.
- Keep the area clean.
- Fires are permitted only in designated areas, and only with wood brought from outside the reserve. Do not leave fires or burning coals
   remove them to the coal collection point.
- Do not bring animals into the reserve.
- Visitors are permitted in the reserve only during opening hours.
- The reserve staff wishes you a pleasant visit!

### **Visiting hours:**

Summer (April through September), daily 08:00–17:00. Winter (October through March), daily 08:00–16:00

Entry to the reserve is up to one hour before closing. On Fridays and holiday eves the reserve closes one hour earlier. To reserve guided tours and for more information, call \*3639 from any phone.



African monarch butterfly

Photo: Shiran Ben-Yaakov

Text: Avivit Gera, curator, Enot Tsukim Nature Reserve
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Production: Adi Greenbaum

## Welcome to Enot Tsukim Nature Reserve

### The Lowest Nature Reserve in the World



Micro-canyon

Enot Tsukim Nature Reserve is located on the northwestern shore of the Dead Sea at the foot of the escarpment cliff, and is 6.5 kilometers long.

The oasis here is called Ein Feshkha, which means the "split" or "cloven" spring. Its name comes from its location in the Dead Sea Valley rift, and from the springs that emerge here (out of the layer of conglomerate that fills the valley).

The reserve has a number of characteristics that differentiate it from anywhere else: It is located in the lowest place in the world; its springs boast varying salinity and temperatures, and it is home to a number of special species of insects and fish.

### **Geological Phenomena**

Enot Tsukim (Ein Feshkha) Nature Reserve is on the western shore of the Dead Sea, in the Dead Sea Valley, which is part of the extensive geological phenomenon known as the Syrian-African Rift. The rift extends from East Africa through the Red Sea, the Arava, the Jordan Valley, the Hula Valley, the Beqaa Valley in Lebanon, and as far as southern Turkey. The Syrian-African Rift was created by the movements of geological plates in the earth's crust, and is a seam between these plates.

The Dead Sea Valley began to develop about five million years ago. Before that time, streams flowed through here from east of the Jordan River directly into the Mediterranean Sea. After the valley appeared, the streams on either side drained into it, filling it with sediment. At a certain stage, as the valley deepened, it connected to the Mediterranean. A large lake formed in which a thick bed of salt was deposited, the same salt that constitutes Mount Sodom. Later processes of geological folding disconnected the valley from the Mediterranean. Some 70,000 years ago the valley contained a lake, called the Lissan Lake, which extended from the area of the Sea of Galilee today to the northern Arava. Its gleaming white sediments can be seen in many places, for example, near Masada and in the northern Arava. Later, the Lissan Lake began to shrink, eventually (some 10,000 years ago) leaving the two lakes we have today: the Dead Sea and the Sea of Galilee.

### **The Springs**

"....the great waters were stayed." (Ezekiel 31:15)

Certain areas of the escarpment cliff on the western edge of the Dead Sea Valley are outlets for water flowing from the west. The water flows to the cliff through an aquifer (water-bearing layer) consisting of limestone and dolomite rocks. It crosses the faults and emerges from the conglomerate layer in the sediment of the Dead Sea Valley.

The source of the spring water in the reserve is rain that falls on the Judean Mountains. The rainwater seeps downward, dissolving salts along the way, and emerges in the oasis along the shore, at the foot of the cliff above the level of the Dead Sea aquifer. The springs emerge at 390 meters below sea level, and have a discharge rate of up to 70 million cubic meters per year. Scholars believe the spring water is saline for two reasons: 1) The fresh water is mixed with water from a deep, primordial saline aquifer; 2) The fresh water is mixed with Dead Sea water that remained trapped when the Dead Sea retreated.

The extent of the mixing results in a wide range of salinity (from hundreds to thousands of milligrams of chloride per liter).

The retreat of the Dead Sea has a significant impact on the location of the springs: The Dead Sea is a very low lake (425 m below sea level, and given to change). The water level continues to drop at an average rate of about one meter per year. It is one of the saltiest lakes in the world, and its water has high density due to its high salinity. Therefore it does not mix with the fresh water of the springs, but rather becomes a kind of "foundation" on which the fresh spring water floats. The point at which the springs emerge depends on the level of the Dead Sea; there is a clear correlation between the expansion of the area where the springs emerge southward and the decline in the level of the Dead Sea. The level has gone down and the shoreline has retreated due to the utilization of the sources of the Jordan in the north (the Dead Sea no longer receives water from the Jordan River), and to the pumping of Dead Sea water into the Dead Sea Works evaporation

**Spotted leopard** (*Panthera pardus*) – The largest carnivore in the country, this member of the feline family has a long body with yellowish-white fur and black spots, and a long tail. The population of spotted leopards is endangered, and only rarely can one be seen in the reserve.

Animals living in the moist habitat are entirely dependent on water:

#### **Invertebrates**

**Levantine freshwater crab** (*Potomon potamios*) – A large crab that lives in freshwater springs.

**Smooth melanopsis** (*Melanopsis buccinoidea*) – A small, black water snail that lives in freshwater and feeds on algae.

**River nerite** (*Theoduxus jordani*) — A snail with a twisting shell, which climbs on plants and trees in the water.

The river nerite and the smooth melanopsis have existed here since the Pleistocene period (a million years before the present).

#### **Amphibians**

These species reproduce in winter and spring.

Marsh frog (Rana Ridibunada) – A tailless amphibian found in springs, it has long legs and webbing between its toes.

**Green toad** (*Bufo viridis*) – A tailless amphibian, which breathes through its moist skin.

#### **Fish**

St. Peter's fish and the Mento tooth-carp originally came to Ein Feshkha through the Jordan and its tributaries. Over time, they became a unique population that differs from related species in the Jordan and its tributaries.

**Common St. Peter's fish** (*Tilapia zillii*) – This species digs pits in the beds of pools in which the female lays 400–600 eggs. The parents hover above the nest, aerating and protecting it. After the eggs hatch, they protect the fry.

**Jordan St. Peter's fish** (*Oreochromis aurea*) – The female keeps its eggs in its mouth. When they hatch, the fry emerge to eat and flee back inside when in danger. The fish's Aramaic name, amnun, comes from the word "mother" (em) and fish (nun), highlighting its maternally protective behavior.

**Dispar tooth-carp** (*Aphanius dispar*) – This small fish ranges from four to six centimeters in length and lives in saline flowing springs. Its origin is in the Red Sea and it exists only around the Dead Sea.

**Mento tooth-carp** (*Aphanius mento*) – A small fish, five centimeters long, which lives in saline water.

#### **Birds**

**Kingfisher** (Alcedo atthis) – Small and colorful, in shades of brown, white and turquoise, this transient spends up to 10 months in the reserve and feeds on fish.

**White-throated kingfisher (Halcyon smyrnensis)** – A resident kingfisher, common in Israel, this bird lives alone or



The ringing of a kingfisher

in pairs, and feeds on fish, amphibians and reptiles. It nests in holes in earthen walls and completes two nesting cycles per year.

**Moorhen** (Gallinula chloropus) – A brown-black aquatic bird with a red forehead and a white stripe along its body, this bird lives near thickets.

Calmorous great reed warbler (Acrocephalus stentoreus) -

A resident species, this brown-olive avian lives and nests in thickets.

Nightingale (Luscinia megarhynchos) – This small, resident songbird lives in thickets. It chirps loudly and even imitates the calls of other birds. It is brownish in color with white stripes, and has a protruding tail.

#### Arabian babbler (Turdoides squamiceps) -

This large, brownish-gray, resident songbird lives in groups with a dominant male and female. It is very active, skipping with its tail upraised as it searches for food on the ground.

**Dead Sea sparrow** (*Passer moabiticus*) – These small and colorful birds wander in flocks and nest in sparse colonies. Its nests in the reserve are around 30 centimeters in diameter.



Arabian babbler



The weaver ant

The reserve is on the bird migration route:

In the fall birds pass through here on their way from Europe to Africa, and in the spring, they fly the other way around.

In the Hidden Reserve you may hear donkeys and perhaps even see them. They were brought here by the INPA to graze in order to thin out the reeds that are taking over the band of vegetation near the flowing springs.

### **Special Inhabitants of the Reserve**

Middle Eastern jewel beetle (Sterapsis squamosa) – This beetle, with its green, glowing metallic color, lives its entire life cycle in the tamarisk tree, feeding on its flowers and adhering its eggs to the bark. After the larvae hatch, they burrow into the bark to mature.



Middle Eastern jewel beetle

The weaver ant (Polyrhachis simplex) –The Enot Tsukim Nature Reserve is the northernmost place in the world where this rare tropical ant is found. In the winter they climb to the tops of the tamarisk trees and weave nests and shelters for the cicadas and aphids on whose honeydew excretions they feed. Worker ants weave their nests with they help of their larvae, which have well-developed silk glands: The worker ant carries the larva by its back, and directs it while pressing it, which stimulates the release of silk strands from an opening in the larva's upper lip. The weaver ant protects itself from its enemies by spraying an unpleasant scent from the end of its body.

3. The band of common reed (Phragmites australis), Italian sugar cane (Saccharum ravannae) and Arabian rush (Juncus arabicus), with Syrian fleabane (Pluchea dioscoridis), golden samphire (Limbarda crithmoides), common hemp agrimony (Eupatorium cannabinum), sea sow-thistle (Sonchus maritimus) and narrow-leaved reedmace (Typha domingensis). This band is located at flowing springs.



Sodom apple

(Photo: Shiran Ben-Yaakov)

4. The band of **Arabian rush** (*Juncus arabicus*) and glaucous glasswort (*Arthrocnemum macrostachyum*) is the "salty band" on the eastern edge of the reserve.

The presence of saline water, combined with high temperatures year-round foster the development of tropical species of Sudanese origin, such as the Sodom apple (*Calotropis procera*) – a tropical-arid plant common to the region. It bears an apple-shaped fruit, which is hollow and filled with feather-like seeds with a fringe that plays an important role in its airborne propagation.

"Thus was it fair in its greatness, in the length of its branches; for its root was by many waters." (Ezekiel 31:7)

**Euphrates poplar** (*Populus euphratica*) is a tall tree of the willow family with a wide crown. It is common on the banks of the Jordan River and also found in oases. It has two kinds of leaves: When young, the leaves are long and narrow like those of a willow, and when mature, they become wide. Because of the shape of the young leaves and the fact that the tree flourishes near water, it is sometimes identified with the willow mentioned in the Bible.

The hot dry climate, saline water and thick vegetation in the reserve draw a variety of animals.

#### **Mammals**

**Golden jackal** *(Canis Aureus)* – This carnivore of the canine family has red-gray fur with a white "bib" and a short tail.



Striped hyena

(Photo: Ro'i Bar)

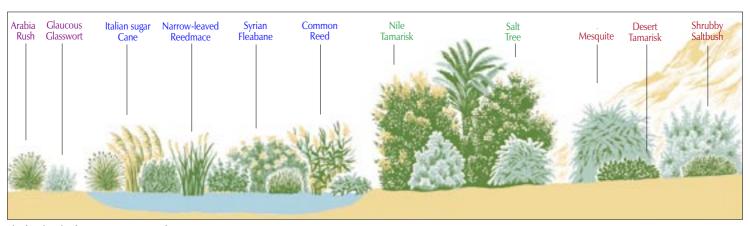
**Striped hyena** (*Hyaena hyaena*) – The largest of Israeli carnivores, nocturnal and feeds off carcasses. It has black slanted stripes on the sides of the body and a black "apron" on its throat.

**Wolf (Canis lupus)** – The largest carnivore in the country of the canine family. It has gray-brown or golden fur and a long tail. It is nocturnal and lives in packs.

**Indian crested porcupine** (*Hystrix indica*) – This is the largest rodent in the country. A nocturnal animal, its body is covered with black and white quills that serve as a deterrent.

**Caracal** (*Felis caracal*) – A carnivore of the feline family, its fur is brown with shades of red, yellow or gray, and it has a short tail. It is active from afternoon though early morning.

**Egyptian mongoose** (*Herpestes ichneumon*) — This nocturnal carnivore of the Herpestidae family is gray in color, has a long body and tail, and short legs.



pools in the south. The decline in the level of the Dead Sea has exposed soft clay rocks that had sunk into the Dead Sea bed. The flowing springs cut through these layers, creating micro-canyons. This phenomenon creates a micro-habitat: Plants can exist only in the channels of these micro-canyons alongside the flowing water, and not above them, where the saline, muddy areas cannot support growth.

Ein Feshkha is the largest natural source of water in Israel that is not utilized by humans!

### The Archaeological Site

The Ein Feshkha site was excavated for the first time in 1958 by Father Roland de Vaux and in 2001 by Professor Yizhar Hirschfeld for the Hebrew University. Research reveals that this was a farm from the first century BCE to the first century CE. It included a residential structure, an enclosed courtyard and an industrial complex that produced balsam perfume.

The short-lived site was destroyed during the Great Revolt of the Jews against the Romans (66–70 CE). It was subsequently resettled, and abandoned for the last time during the Bar Kokhba Revolt (132–135 CE).

The residential structure is a country villa typical of the Dead Sea region at the beginning of the Roman period. It has an internal, unroofed courtyard, which helped ventilate the house. The planning is typically Roman. The building technique, characteristic of the region in this period, can be seen in the remains of the structure: The walls were made of field stones and were plastered, the doorways were of dressed (chiseled) stone, with doors and doorposts made out of date-palm trunks. The rooms were floored with small stones topped by an earthen layer. Roofs were made of date-palm trunks and clay. Floor tiles uncovered in the ruins attest to the grandeur of the building.

**An enclosed courtyard** next to the villa served as a stable for horses and a sheep pen.

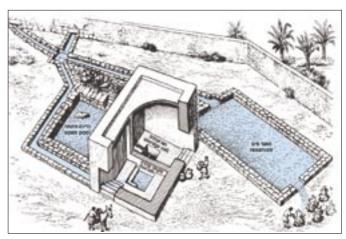
**The industrial complex** included two water channels, a reservoir, and a production facility for balsam perfume, consisting of an open pool and two roofed rooms. One room contained a constructed cell for storage, and the other, a ritual bath.

The channels led water from a spring that emerged on the northern side of the industrial complex (the spring no longer exists at this point) to the reservoir and the production rooms. Water from the reservoir irrigated balsam plants that were cultivated near the complex.

One of the roofed rooms alongside the open pool contained a soaking pool to produce the balsam essence and a storage cell for the perfume. The ritual bath in the second room was used by workers before setting to their tasks. The large, round stones found in the complex were used to crush the balsam branches to produce the essence.

According to ancient sources, balsam plants were cultivated in the Dead Sea region. The most detailed of these sources is Pliny (23–79 CE), who says that balsam plants were raised near Jericho and the Dead

Sea. He describes the plant as a shrub about one meter high, with small, feathered leaves. Two products derived from the plant: a salve made from sap extracted from the trunk by means of an incision in the bark, and perfume, produced from the pruned branches. The perfume production process consisted of four stages: the crushing of the branches; soaking them in the open pool to produce the essence; storage of the essence; and boiling it down to produce the perfume. Balsam perfume was an expensive commodity in Mediterranean and European lands. According to Professor Hirschfeld, the inhabitants of the farm raised the balsam plants in the area next to their villa, produced the perfume in the industrial complex and exported it via the port of Gaza. It should be remembered that the final stage in the production of balsam perfume utilized ovens, which were not found in the industrial complex. Professor Hirschfeld believed that this part of the process was carried out at nearby Qumran, where a number of ovens were found.



The industrial complex for balsam production

Other scholars argue that the pools and crushing stones of the industrial complex were used to crush and soak dates to produce date wine or date honey. Dates were in fact raised in the region, and were an important part of the inhabitants' diet.

