



The Spring and the Pool

Jerusalem's water supply has been vulnerable to attack since antiquity, prompting ingenious solutions that have long intrigued archaeologists. What made the city's water source so unusual – and how was it protected from enemies?

Where To?

Gihon Spring
Water tunnel and fortifications
by the historic City of David



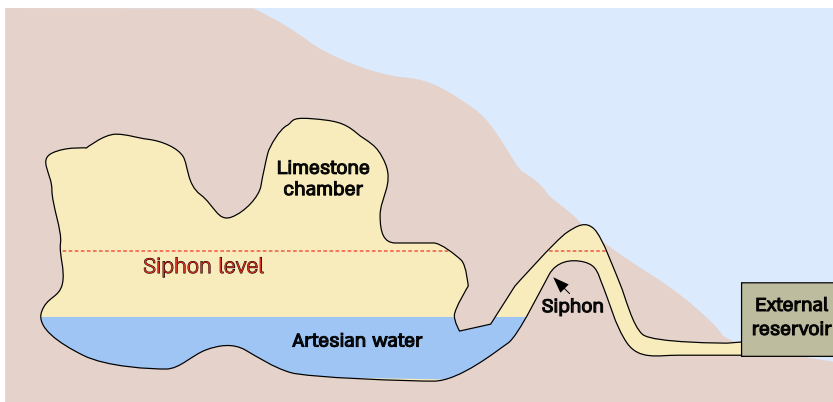
Jerusalem is famously a pilgrim city, drawing tourists every Pesach and Sukkot. The road where irritable bus drivers now honk at the constant congestion beside the Old City entrance regrettably known as Dung Gate was once the main thoroughfare leading from Jerusalem's main water source, the Gihon Spring, up to the Temple. Each day of Sukkot, water was poured onto the Temple altar in the hope of persuading the Lord to bless us with bountiful rains.

This ceremony began early in the morning, after a night of revelry during which Second Temple sages juggled torches and performed other nifty party tricks. As the assembled wiped sleep from

their eyes at the close of another nocturnal *Simhat Beit Ha-shoeva* (Celebration at the Water-Drawing Site), a procession of priests dressed in white ventured out of the Temple and into the Kidron Valley. One carried a golden water pitcher.

As children cheered and Levites trumpeted, the group stopped at the Gihon Spring, at the bottom of the valley, while the priest filled his vessel with pure spring water. Everyone then trudged back up to the Temple.

The route was the same now taken by musicians accompanying families to the Western Wall for bar mitzvas and by busloads of tourists visiting the Jewish people's holiest site apart from the Temple Mount. Most have



no idea where to find the Gihon and, if they did stumble across it, would probably confuse it with the more famous Siloam Pool – part of a later feat of water engineering (see below). But let's concentrate on the spring – God's gift to Jerusalem.

Pumping and Surging

The Gihon as a body of water appears right at the beginning of the Bible, in Genesis 2, where the description of the Garden of Eden includes a river called Gihon encircling the land of Cush. The Jerusalem spring itself is

After two centuries of excavations, new discoveries are still altering archaeologists' conception of Jerusalem's ancient water system. The entrance to Warren's Shaft

Photo: Davidbena

Dynamic equilibrium turns the Gihon's subterranean chambers into a kind of siphon. Diagram showing when and why the once intermittent spring used to spout water

Diagram: Tamar Hayardeni



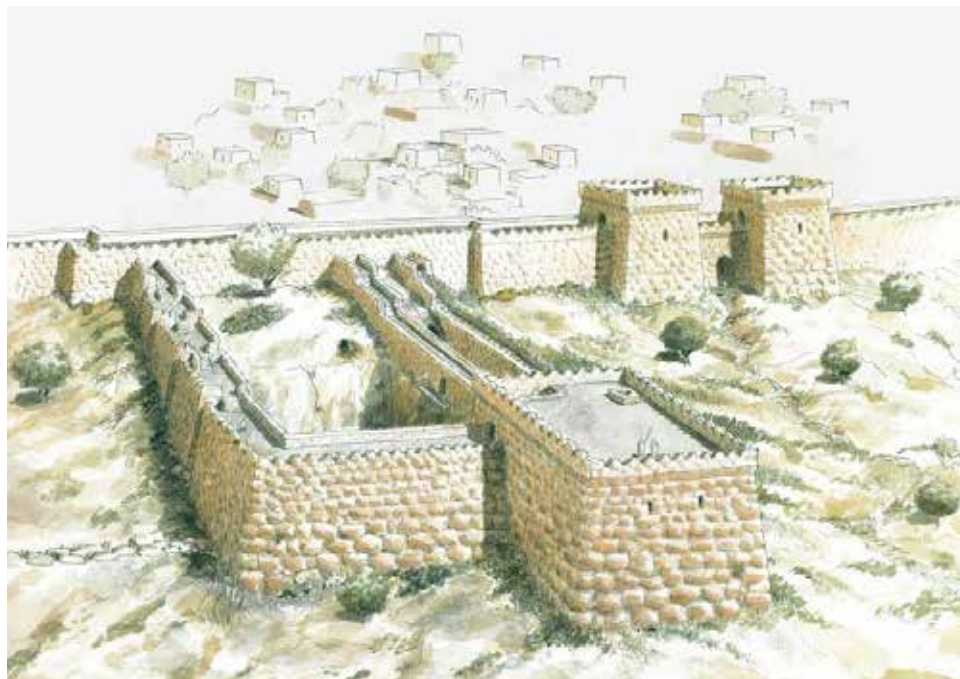
mentioned only in the first book of Kings, when an aged King David sends messengers to anoint his son Solomon as king over Israel and end family squabbles over his soon-to-be-vacant throne. The coronation takes place beside the water:

So Zadok the priest and Nathan the prophet have anointed him king at Gihon; and they have gone up from there rejoicing, so the city is in an uproar [...]. (I Kings 1:45)

The name of the spring has intrigued commentators for generations, prompting all kinds of interpretations, but the simplest involves the Hebrew root *g-h*, “surge”: The Gihon is so called because it gurgles up from the ground.

You might think this explanation too literal, as *all* springs emerge from the earth, but in fact the Gihon was unusual. Every two to three hours, it gushed up for fifteen minutes, as recorded by French Dominican friar and archaeologist Louis-Hugues Vincent in 1909.

Intermittent springs such as the Gihon are the product of a natural underground basin in which artesian water collects before spurting through a passage in the form of a siphon. Only when both basin and siphon are filled to



overflowing can water burst forth from the mouth of the spring. You can actually see this effect in action above ground at Ein Fawar (a.k.a. Ein Mabua), a spring on the Perat Stream, in the Judean Desert.

But as anyone who’s recently gone paddling in the Gihon will tell you, it looks like a perfectly ordinary spring with nothing intermittent about it. That’s because in 1927, a severe earthquake reshaped the basin (though the Gihon was lucky compared to the Ein Rogel spring a few hundred meters further down the Kidron Valley, which has dried up as a result of similar seismic disturbances).

The Spring beyond the Walls
Three immense waterworks have sprung up around the Gihon over

Jebusite fortifications surrounding the spring effectively brought the water within city limits. Illustration by Leonardo Gurevitz, directed by Eyal Meron

Courtesy of the City of David Archive of Ancient Jerusalem

Defense and topography determined the site of Jerusalem on a hill overlooking the spring

the centuries: a subterranean access tunnel, formidable fortifications, and the Siloam water channel and pool.

As all were built right next to each other in a typical archaeological jumble, even the savviest scholars have been scratching their heads for years over the question of which preceded which and what exactly went on here. Adding to the confusion, excavations in the City of David periodically turn up remains that refute all previous theories.

The latest of these finds is an enormous dam dated to the ninth century BCE (see “Snapshots,” p. 6), some three millennia ago, and thought to have been constructed to store water from flash floods during a few particularly dry decades. This construction may have been responsible for the Siloam Pool – somewhat later than had been assumed, reassigning it to the Israelite era rather than the Canaanite.

How did the multilayered Gihon-Siloam water system develop?

The Gihon discharges an impressive 600,000 cubic meters of H₂O a year, making it one of the most plentiful water sources in the Judean Desert. That’s probably why the Jebusites established a city, Jebus, beside the spring some 4,500 years



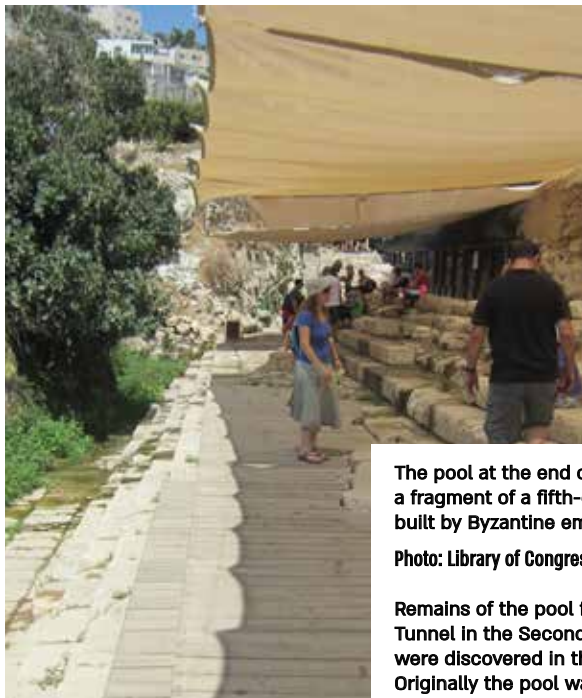
Contrary to the Palestine Exploration Society's conclusions, Warren's Shaft wasn't part of an artificial water system, but merely a natural phenomenon. Members of the society's late-19th-century delegation. Charles Warren is seated at left

Photo: PEF

Jerusalem's ruins fired European travelers' imaginations. *Descent to the Gihon Spring*, watercolor print based on a painting by David Roberts, 1842

Library of Congress Collection

ago. The only problem was the Gihon's location at the bottom of the Kidron Valley, whereas Jebus was strategically built on the hill above it. Sheer drops on all but



The pool at the end of the tunnel is just a fragment of a fifth-century reservoir built by Byzantine empress Eudocia

Photo: Library of Congress Collection

Remains of the pool fed by Hezekiah's Tunnel in the Second Temple period were discovered in the last decade. Originally the pool was square and surrounded by descending steps, only one section of which has been unearthed to date

Photo: Ovedc

the north side made the city more or less impregnable but left the spring outside its walls.

In peacetime, Jebusite women simply popped down to the watering hole, jugs in hand. Under siege, however, not only was water out of reach, but Jebus' enemies could splash merrily in its shallows while the city's parched defenders looked on helplessly.

The Jebusites hit on a novel solution. Deep beneath the city wall, they built a tunnel to the spring, ensuring a plentiful water supply safe from prying eyes and enemy arrows. A channel was then dug backward from the mouth of the spring, keeping any excess puddling far from its source.

We can just imagine a frustrated foe encamped beneath the mighty fortifications, intent on besieging the Jebusite city. Well hidden by rocks, trees, and signs boldly pronouncing, "Don't even *think* of finding water here," the Gihon periodically gurgled away. Behind the locked city gates, the Jebusites looked down on their bewildered, thirsty enemies while toasting their own good fortune, clinking goblets of precious water. Eventually the would-be attackers would give up, leaving the Jebusites to enjoy their secret spring in peace.

The Mysterious Shaft

The ancient tunnel was discovered by English explorer

With the spring outside the city walls, Jerusalem was cut off from its water source when under attack

and military officer Charles Warren in the 19th century, during excavations carried out by the British Royal Engineers for the Palestine Exploration Fund. Warren spent months digging down dozens of meters, uncovering the steep floor of the Jebusite tunnel, until he reached something unexpected: a duct descending another fourteen meters, known to this day as Warren's Shaft.

Generations of tour guides have stood by this shaft, Bible in hand, and described how ginger-haired young King David came to capture the city, discovered the spring, and stood peering up through the aperture, wondering how to breach the formidable Jebusite defenses. Wriggling through the narrow but thankfully short tunnel, David realized the key to his conquest was this secret shaft.

Now David said on that day,
"Whoever smites the Jebusites
and reaches the shaft (*tzinor*)
[...]." (II Samuel 5:8)

I Chronicles completes this oblique verse:

Now David said, "Whoever
smites the Jebusites first shall
be chief and captain." And Joab
son of Zeruiah went up first and
became chief. (11:6)

All the pieces of the puzzle
seemed to fall into place, with
the archaeological record and

By the By

→ The Hebrew word *nikba*, "channel," appears nowhere in the Bible or in any other ancient Hebrew source apart from the Siloam Tunnel inscription.

→ The Siloam inscription is no longer in situ; it was peeled off the tunnel wall in the 19th century (breaking the artifact in several places in the process) by a Jerusalem resident and confiscated by the city's Ottoman governor for display in an archaeological museum in Istanbul. The inscription is still there on the second floor, which is generally closed to visitors (unless some particularly enthusiastic Israeli tour group bribes the museum guides for a peep). Those braving the Siloam Tunnel must therefore suffice with the copy now hanging where the original once was.

→ Traversing Hezekiah's Tunnel involves stooping much of the way to avoid hitting your head on the low roof. Toward the end, however, the ceiling suddenly rises dramatically. Scholars speculate that the roof wasn't raised; rather, the floor was lowered. Why?

When the two halves of the tunnel were finally connected, everyone was devastated that no water flowed through. As the whole point was that the tunnel slope downward, stimulating water flow, the floor closer to the pool was lowered. Even then, there was more of a trickle than a flood. Hence the prophet's description of the Siloam as "slow-moving" (Isaiah 8:6).

→ The Siloam Pool today, at the end of Hezekiah's Tunnel, is a narrow and somewhat smelly puddle with a few pillars gesturing to its former glory. This pool is in fact a small part of a much larger one hewn on the grounds of the Byzantine Siloam Church in the fifth century. In a word, the fragment isn't the veritable water park described in Kings and Chronicles and built by Hezekiah. That's because originally the tunnel extended a good few meters down into the valley, ending in a pool of much more generous proportions, over which another was built in the Second Temple period, this time with steps leading down into it. Nothing remains from Hezekiah's time, but the later pool is still visible – and impressive.

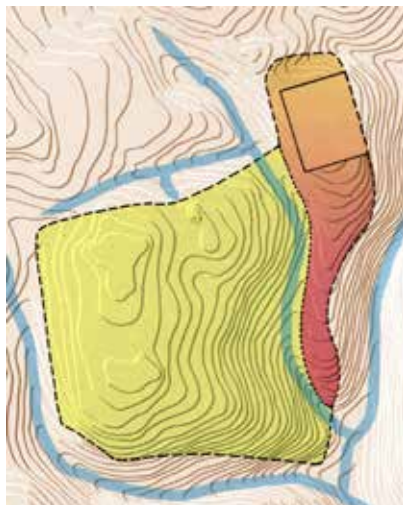


the biblical text dovetailing for a change – until the late 20th century, when some persnickety researchers poked around a little more and discovered to everyone’s annoyance that Warren’s Shaft doesn’t actually lead anywhere and is in fact a naturally occurring karst chimney as old as time.

The tunnel leading from the city to the spring didn’t end at the shaft, but continued a few dozen meters past it, ending at an enormous, hidden, man-made pool into which the spring water was channeled via a short, subterranean extension. Accordingly, the term *tzinor*, previously understood to mean “water shaft,” had to be reinterpreted as any kind of water system – vertical, sloping, or otherwise.

Then matters became even more complicated. Further excavations revealed a wall protruding like an ear from the original city wall and interspersed with massive towers that surrounded both pool and spring. Archaeologists wondered: Why dig an underground tunnel to the water when the spring itself was protected by this additional wall?

Possibly, they concluded, there were two stages of development. First the tunnel was dug to provide access to the water beyond the wall; then fortifications secured the



Contour lines show the height differences between the Western Hill (yellow), City of David (red), and Temple Mount (orange). Once all three elements were encompassed by Hezekiah’s city wall, spring water could be channeled into Jerusalem. Today’s Old City was built much later, most of it just north of biblical Jerusalem

spring, obviating the tunnel – and ensuring that no aspiring conqueror or Israelite general Joab could crawl backward from the spring at the tunnel’s mouth and surprise the city.

At this point in our story, the riddle of David’s conquest remains, but two of his city’s three major waterworks – the tunnel and the fortifications – have been connected to the Gihon Spring.

Encircling the Pool

The site’s third and most astounding engineering feat is also the most modern, though by now it’s well over 2,700 years old. As the Bible tells us, King Hezekiah built a water channel in anticipation of an Assyrian invasion soon to lay waste to most of his kingdom:

A tunnel descended deep below the Jebusite city to a giant, hidden pool hewn from the rock

And when Hezekiah saw that Sennacherib had come, and that his purpose was to make war against Jerusalem, he consulted with his leaders and commanders to stop up the water from the springs that were outside the city; and [these men] helped him. Thus, many people gathered together who stopped up all the springs and the brook that ran through the land, saying, “Why should the kings of Assyria come and find much water?” (II Chronicles 32:2–4)

You might think no more was accomplished here than the Jebusites had already achieved, but in fact Hezekiah’s project was a breakthrough. It stemmed from another change he’d wrought in Jerusalem, a reaction to the Assyrians’ wholesale destruction of the Kingdom of Israel, on his northern border, in 722 BCE.

Both Jebusite and Davidic Jerusalem had been bounded on their eastern side by the Kidron Valley and to the west by what later became known as the Tyropoeon or Cheesemakers’ Valley. In time, the city expanded onto the hill beyond the Tyropoeon, but this new neighborhood remained unprotected by any wall. As refugees fleeing the Assyrians



flooded the new area, Hezekiah safeguarded them from the approaching enemy by encircling the unimaginatively named Western Hill (later divided into two sections, the Lower and Upper City) with an entirely new wall.

And he strengthened himself, built up all the wall that was broken, raised it up to the towers, and built another wall outside; and he repaired the Millo [landfill]

Hezekiah's Tunnel, connecting the Gihon Spring and Siloam Pool

Photo: Tamar Hayardeni



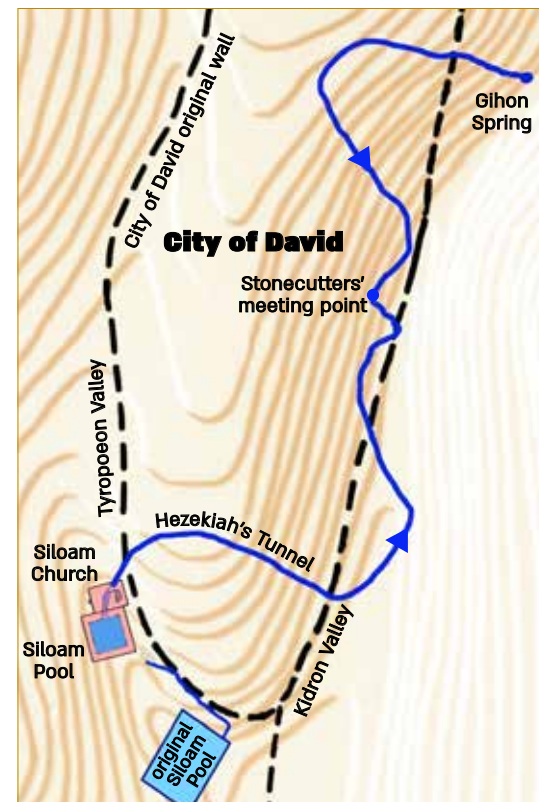
in the City of David and made weapons and shields in abundance. (ibid. 32:5)

What does any of this have to do with the Gihon Spring? When the Western Hill was incorporated within the walls of Jerusalem, something unprecedented in the city's long history occurred: Jerusalem now included a point topographically lower than the spring – in the Tyropoeon Valley.

Wise Hezekiah immediately understood the significance of this unexpected development. The height differences meant that for the first time, water could flow from the mouth of the spring to that lower point inside the city walls simply by force of gravity. In one fell swoop, the extra fortifications, the tunnel, and the shafts all became obsolete. The point where water gushed from the Gihon into the Kidron Valley outside the city was permanently stopped up. Instead, water pooled conveniently at the base of the Tyropoeon, in what would soon be called the Siloam Pool.

The Channel Is Complete!

Of course, it wasn't that simple. A channel had to be dug through which gravity would elegantly propel the Gihon's flow down into the Tyropoeon Valley. A commando unit armed with shovels and



The two stonecutting teams zigzagged toward each other to increase their chances of eventually meeting

Illustration by Tamar Hayardeni

buckets immediately went to work, separating into two spearheads to streamline the process. One group set out from the spring, while the other started from its coworkers' destination, a pre-dug pool ready and waiting to be filled in the depths of the valley. To ensure that both teams eventually met, it was decided that instead of moving forward in a straight line, hoping not to miss each other, they'd advance along a slalom path. The mileage would be greater, but with no GPS to rely on, a rendezvous would be much likelier.

The map shows how the diggers moved toward one another; the poolside contingent took the slalom concept to an extreme,

Once Jerusalem included a point lower than the Gihon Spring, gravity drew water to the city

veering off to the foot of the Mount of Olives, way east of the City of David. You can also see more or less where the two groups met – and marvel that they ever did, considering the relatively primitive conditions and the Assyrians all but breathing down their throats. We're lucky to have an authentic account of the reunion – on a tablet inscribed in paleo-Hebrew script and attached to the wall of the tunnel, not far from its exit. Discovered in the late 19th century, the inscription conveys the tremendous excitement as the teams converged:

The channel is complete! This was the matter of the channel: while the diggers were still wielding their axes toward one another, three cubits from where they would break through, they heard each other calling [...], and on the day [the channel] pierced through, the hewers struck their axes one upon the other, and the water flowed from the source [of the spring] to the pool.

Surely the stuff of a Hollywood blockbuster.

We'll probably never know how long this operation took, but we do know it was concluded before the Assyrians showed up in Jerusalem in 701 BCE, five verses later in the same chapter of Chronicles.

The Bible lists the incident among Hezekiah's crowning achievements:

This was the same Hezekiah who dammed the upper pool of the waters of Gihon and directed them down to the western side of the City of David. (ibid. 32:30)

Eventually, the underground aqueduct became known as Hezekiah's Tunnel, or the Siloam (*Shiloah* in Hebrew) Tunnel, because it "sent" (*shalah*) the water from outside the city walls to within them. Together with the Broad Wall, built by Hezekiah around the Western Hill, this initiative stopped the Assyrian enemy in its tracks. The troops soon gave up besieging Jerusalem and slunk thirstily back to their Mesopotamian hole.

None of these three great engineering projects would have been conceived of without the Gihon Spring. In the 20th century, this once vital source of water became instead a source of income – as one of Jerusalem's most popular tourist attractions. After all, what's more fun than a torchlit wade through freezing water in a channel almost three millennia old? □



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Handy Info

■ Where to Eat

Hatzer Ba-rova
(Jewish Quarter Court)
2 Tiferet Yisrael Street
Kosher, meat, 050-425-5114

Holy Café
2 Tiferet Yisrael Street
Kosher, dairy, 050-352-5400

Cardo Pizza
124 Ha-Yehudim Street
Kosher, dairy, (02) 627-2321

■ Don't Miss

Western Wall Tunnels
Tour with virtual models
Entry fee, *5958

Chain of Generations Center
Israeli singer Evyatar Banai serves as virtual host of this journey through Jewish heritage
Entry fee, *5958

Davidson Center
Archaeological garden and museum
Entry fee, (02) 626-5906