



YAḲČĀL

YAḲČĀL (lit. “ice pit”) and **YAḲDĀN** (lit. “ice container”), a building for storing blocks of ice or, very rarely, compressed snow, which are collected in the winter for use in the summer. Until the early 20th century, *yaḳdān* was more common than *yaḳčāl* (see the respective entries in *Dehḳoda*), and in Khorasan and Kerman province, *yaḳdān* is nowadays often used as a synonym of *yaḳčāl*. Until the 1960s, when mechanical, electrical- or kerosene-driven refrigeration became available in most of Iran, the *yaḳčāl* was one of the main features of Iranian vernacular architecture, reflecting adaptation to the dry conditions and extreme temperatures of the semi-arid climate of the Iranian plateau (see **DESERT**), in particular its scorching summer heat. Nowadays an ice-house is often called *yaḳčāl-e ḡadimi o-sonnati*, and up to 2005 the Iranian Cultural Heritage Organization (ICHO) had registered 56 ice-houses, four of which date to the Safavid period (Pāzuki and Šādmehr, pp. 91, 125, 330, 457).

Use and typology. Iranian ice-houses were facilities for the storage of solid ice, ensuring that ice was available for local distribution during the summer; they were not used for refrigerating foodstuff. In its simplest form, the *yaḳčāl* was a storage pit dug in the ground, and covered with straw, rush, and earth for protection and insulation against sunshine and heat. Such pits seem to have been in use since the 1st millennium BCE, if not earlier. There is, however, no archeological or textual evidence as to how in Iran simple pits developed into ice-houses. Some pits were covered with their own **domes** and thus became independent buildings, while others were located in the cellars of larger buildings. Walled ice-houses had open pits whose south side was protected by



tall shading walls, often extending to the pits' east and west sides as well.

Many yağčāl relied on shallow, open-air basins (*yağband*) for on-site ice production. During the frosty winter months, a thin layer of water, about 5-10 cm, was poured into the open-air basins, where it would freeze overnight. The next day a second thin layer of water was poured atop the previous night's ice. This process was repeated until the ice in the basin had reached a height of about 50 cm. The thick layer of solid ice was chopped into blocks and brought inside the yağčāl for long-term storage. Afterwards the process began anew with pouring the first thin layer of water into the open-air basins. On-site ice production was employed whenever ice could not be easily obtained from nearby mountains, and the yağčāl depended for its water (see [ĀB iii. The Hydrology and Water Resources of the Iranian Plateau](#)) supply on a system of underground irrigation canals (*qanāt*, *kāriz*) and water reservoirs (*āb-anbār*).

Ice-houses took maximum advantage of the environmental conditions, in particular soil and climate, of the Iranian Plateau. The excavated earth was used for the production of sun-dried mud bricks, which, together with mortar and plaster, were used for the construction of domes, shading walls, and water-supply channels (Wulff, p. 108). The buildings ([Figure 1](#)), as well as their operation, were completely organic, using only on-site raw materials, water, and manual labor.

Domed ice-house complexes were an important part of Iranian vernacular architecture, which includes residential dwellings, bazaars (*bāzār*), bathhouses, windmills and watermills (see *āsiā* or *āsiāb* "mill"), fortresses, pigeon-towers, wind-towers (*bādgir*), and water reservoirs. Although domed water reservoirs often resemble domed yağčāl, water reservoirs are always built of fired bricks, which can resist the humid environment, while ice-houses are built from mud bricks. Water reservoirs have an external staircase leading down to an underground water tap at the tank's bottom and are occasionally equipped with wind-towers to ensure the ventilation of the dome's interior. In many cases abandoned water reservoirs were used for ice storage (Enāyat-Allāh, p. 182). Yet yağčāl could never be used as water reservoirs, because ice-houses can only accommodate humidity or water at the bottom of the ice pit, where melted water can seep into the ground.

Rural communities needed to provide significant resources to maintain their man-made water supply systems, such as qanāt (see [KĀRIZ iii. Economic and Social Contexts](#)), and to ensure an equitable distribution of its water.

Wherever qanāts were owned by an endowment (*waqf*), the dependent ice houses were often co-operative ventures. But ice-houses were also operated by individual businessmen and landowners. In some villages there were celebratory festivals when the yakčāl was filled with ice in the winter and when it was opened for ice distribution in the summer, indicating the great importance of ice-houses for their communities until the second half of the 20th century.

Literary evidence. In writings from the Kingdom of Mari on the upper Euphrates, dated to the 18th century BCE, there are the first references to an ice-house (Assyrian *bīt šurīpi*; see *CAD XVII/3*, 1992, pp. 348-49 s.v. “šurīpu”). For these ice-houses, blocks of ice were transported from nearby mountains to the court, and their main function seems to have been the cooling of the king’s wine. These ice-houses were probably cellars inside large palace structures, and not separate buildings.

Since Greek sources (in particular Polybios, 10.28) suggest that on the Iranian plateau qanāts were known toward the end of the Achaemenid period, in the second half of the 4th century BCE, Pierre Briant (pp. 33-38) has suggested that underground irrigation canals were invented in the 1st millennium BCE and that in the 4th century BCE their use gained momentum when Achaemenid rulers granted tax relief for water supply systems. Although there is neither archeological nor textual evidence, it seems probable that the development of water reservoirs and ice-houses followed the expansion of settlements that relied on irrigation systems for their agriculture.

[Athenaeus](#) (3rd century CE) recounts a story by [Chares of Mitylene](#) (4th century BCE) about [Alexander the Great](#) (356-323 BCE) using earthen pits for the storage of snow during his Indian campaign (*Deipnosophistae*, 3.124c). It is tempting to speculate that Alexander’s army picked up this refrigerating technique when passing through northern Iran during the year 330 BCE.

With regard to Islamic Iran, ‘Ali Akbar [Dehḵoda](#) refers in the entry on “yakdān” in the *Loḡat-nāma* to an anecdote from the *Anis al-ṭālebin* by Salāḥ-al-Dīn b. Mobāarak Boḵāri (14th century); in the anecdote, *foqqā’*, an effervescent drink, is kept in an ice-house. The popular dessert *fāluda* or *pāluda* (see Dehḵoda s.v. “pāluda”; Lane, p. 2439, s.v. “fālud”) illustrates the uses of ice in food long before the second half of the 20th century.

In the 17th century, when the first ice-houses were built in Europe, European



travelers mentioned for the first time ice-houses in Iran. For example, [John Fryer](#) (d. 1733) reported that he saw ice-houses outside Shiraz (p. 250 = letter V, chap. IV). But in contrast to Iran, European ice-houses were used for preserving drinks and foodstuff in cold storage. They were outbuildings of castles and manor houses or belonged to commercial building complexes, such as butchers, dairies, and inns; their ice was usually taken from nearby moats and lakes.

Recently, [Vahid Qobādiān](#) (p. 322) observed that walled or underground ice-houses usually belonged to commercial enterprises in large urban communities near the desert. There were formerly, for example, more than 80 ice-houses in Tehran and more than 40 in Isfahan, and ice-making basins belonged to all of these.

Survey of Iranian ice-houses. Between 2007 and 2009 the author identified, registered, and mapped the sites of 129 ice-houses on the Central Plateau, especially on the fringes of the Dašt-e Kavir and the Dašt-e Lut ([Jørgensen](#)). On 104 sites, there were still remnants of the physical structures, and all three yakčāl types were represented: 111 domed, 12 underground, and 6 walled. In 58 instances, the domed ice-houses were ice-making basins, because ice could be easily obtained from the nearby [Alborz](#) mountains. The other 53 domed ice-houses were halfway between the large deserts and the Zagros mountains, and depended for their water supply on qanāts. Of the 129 surveyed sites, only 47 were also included in the 2005 ICHO register ([Pāzuki](#) and [Šādmehr](#)), which had counted a total of 56 ice-houses in all of Iran.

Preservation initiatives have mostly neglected the traditional industrial mud-brick architecture ([Figure 2](#)), and the few remaining ruins may soon disappear. Only about 10 percent of the registered domed ice-houses have been partially restored. In general, preservation measures focus on the dome proper, and occasionally extend to the associated shading walls. But they never include the ice-making basins and water-supply channels.

The most spectacular domed ice-houses can still be found in central Yazd province. At the outskirts of [Abarquh](#) the three domes are still visible. Another domed ice-house structure has been preserved at the former road station and [caravansary](#) of [Meybod](#), which is a popular tourist destination. These four domes are all 18 meters tall, and their diameters range 20-23 meters.

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