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ABBREVIATIONS

- AASOR Annual of the American Schools of Oriental Research
ADAJ Annual of the Department of Antiquities of Jordan
AJA American Journal of Archaeology
AfO Archiv für Orientforschung
ANET Ancient Near Eastern Texts Relating to the Old Testament³, ed. J.B. Pritchard, Princeton, 1969
BA The Biblical Archaeologist
BASOR Bulletin of the American Schools of Oriental Research
BT Babylonian Talmud
CAD Chicago Assyrian Dictionary
CIS Corpus Inscriptionum Semiticarum
DJD Discoveries in the Judean Desert
DSD Dead Sea Discoveries
EI Eretz-Israel: Archaeological, Historical and Geographical Studies
ESI Excavations and Surveys in Israel
IAA Reports Israel Antiquities Authority Reports
IEJ Israel Exploration Journal
JAOS Journal of the American Oriental Society
JBL Journal of Biblical Literature
JCS Journal of Cuneiform Studies
JEA Journal of Egyptian Archaeology
JNES Journal of Near Eastern Studies
KAI W. Donner and W. Röllig: *Kanaanäische und aramäische Inschriften* 1–3, Wiesbaden, 1962–1964; 1^s, 2002
NEAEHL The New Encyclopedia of Archaeological Excavations in the Holy Land (English Edition), Jerusalem, 1993
PEQ Palestine Exploration Quarterly
PT Palestinian Talmud
QDAP Quarterly of the Department of Antiquities in Palestine
RA Revue d'Assyriologie et d'Archéologie Orientale
RB Revue Biblique
RE Pauly-Wissowa's Realencyclopädie der classischen Altertumswissenschaft
RQ Revue de Qumran
VT Vetus Testamentum
ZA Zeitschrift für Assyriologie
ZDPV Zeitschrift des Deutschen Palästina-Vereins

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Lever-and-Drum Presses at Moshav Habonim and Ḥorvat ʿAqav (Ramat Hanadiv)

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ABSTRACT: Several rock-cut trenches uncovered at Moshav Habonim were almost certainly parts of lever-and-drum presses. Similar installations were previously published from Ḥorvat ʿAqav; although not recognised as lever-and-drum presses, we believe they should be interpreted as such. In Israel, lever-and-weight presses first appeared in the Iron Age and continued to be used until recent times. They were the main type of press to be used in North Africa, southern France, Greece and the Crimea as well. In Italy and former Yugoslavia, however, the lever-and-weights press was unknown, and there the lever-and-drum press was used. Cato the Censor and Pliny the Elder both make reference to it, and examples have been published from southern France, Italy and former Yugoslavia. In these, the drum is held between two drum piers made either of stone or of wood (Cato's *stipes*). The lever-and-drum presses at Moshav Habonim and Ḥorvat ʿAqav are the first to be reported from the Levant. They are also the first anywhere in which the sockets holding the drum appear on the sides of a rock-cut trench. In our opinion, knowledge of the existence of lever-and-drum presses reached the region from Europe but without details, and thus, a unique type was invented.

IN recent excavations south of Moshav Habonim (map ref. 19405 72665), several installations that are almost certainly lever-and-drum presses were uncovered (ʿAd 2011). To the best of our knowledge, these are the first installations of this type in Israel and all the surrounding regions to be identified. It is also argued that similar, previously published, installations from the neighbouring site of Ḥorvat ʿAqav (Ramat Hanadiv) are also lever-and-drum presses, although they were not identified as such by the excavators.

THE EXCAVATIONS AT MOSHAV HABONIM

The installations in question from Moshav Habonim were uncovered in a salvage excavation conducted in November and December 2007 (fig. 1).¹ In the south (Area B) a very large Byzantine church was excavated, and in the north (Area A)

¹ The excavations were carried out by the Israel Antiquities Authority under the direction of Uzi ʿAd, assisted by M. Tabar, ʿA. a-Salaam Saʿid and E. Oren (area supervisors) S. Yaʿakov-Jam and E. Bachar (administration), R. Mishayev and T. Meltser (surveyors), T. Sagiv (photography), D. Sion (metal), and P. Gandelman (pottery). The aerial photography was carried out by Sky View.

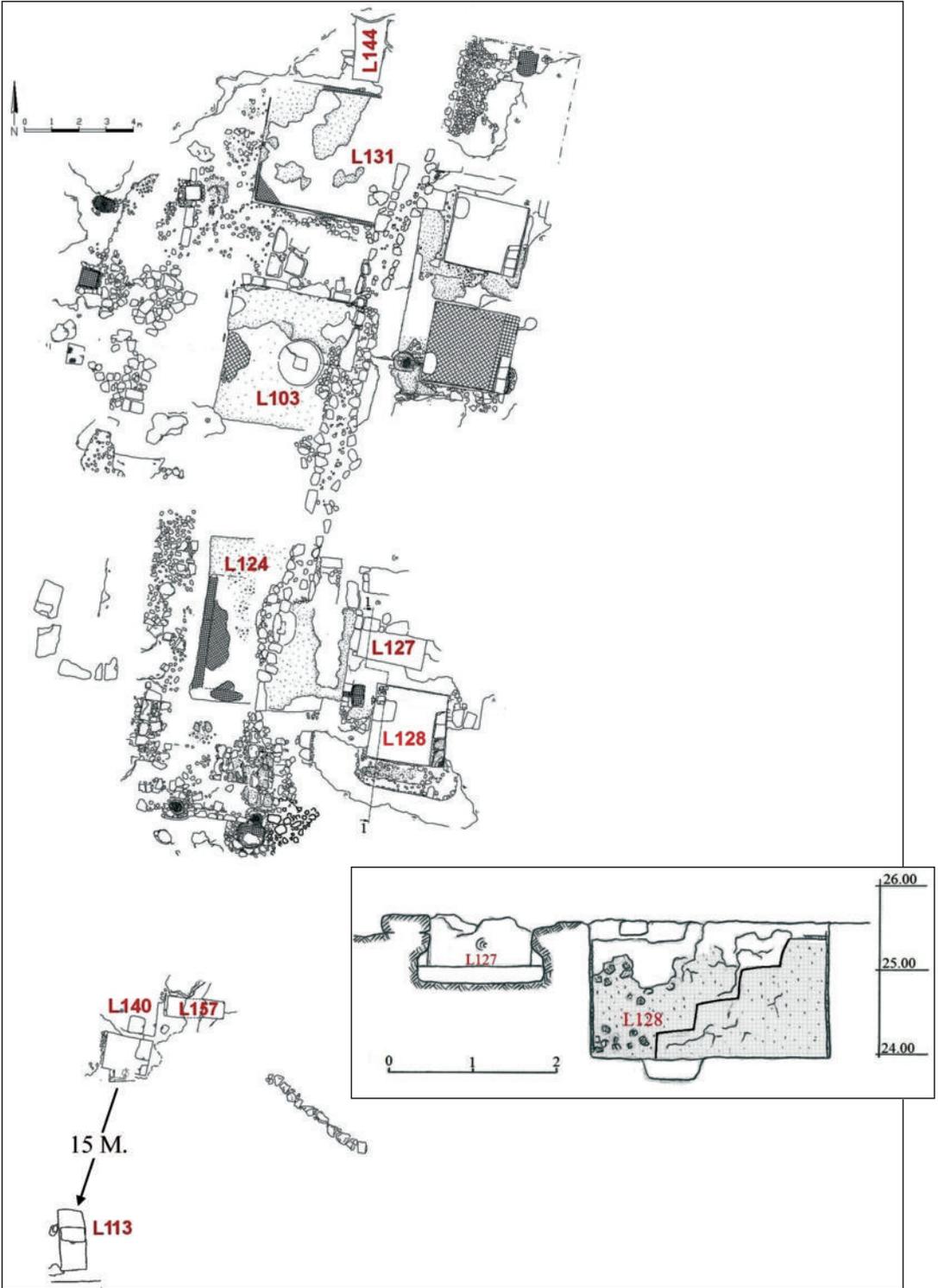


Fig. 1. The Moshav Habonim wine presses: plan and section

one wine press from the Roman period (the fill above it was dated to the third–fourth centuries CE, but the press was probably older) and three from the Byzantine period were uncovered. In the Early Islamic period a field wall was built over the wine presses.

The three Byzantine wine presses are close to one another, creating one large unit (30×18 m.). Each wine press consists of a treading floor paved in mosaic with an intermediate vat and a collecting vat to the east. The vats were also paved in white mosaic, and their walls were covered in a thick layer of hydraulic plaster laid over a layer of chalk plaster that included sherds. All three collecting vats have small sumps adjacent to their western walls; these sumps have mosaic floors and plastered walls. Flights of three or four steps were attached to the eastern walls of the vats. There were round screw bases for single fixed screw presses in the centre of the treading floor of the southern (L124) and central (L103) wine presses. These two presses bear traces of auxiliary floors with small collecting basins, also with mosaic floors and plaster walls. A better preserved auxiliary floor with collecting basin lies to the north of the collecting vat of the northern wine press (L131). Part of the treading floor and intermediate and collecting vats of a fourth wine press were found further south (L140). As noted above, although dated to the Late Roman period, it is very similar to the Byzantine wine presses, with one difference: it bears no trace of a mosaic.

THE LEVER-AND-DRUM PRESSES AT MOSHAV HABONIM

Four very similar rectangular rock-cut trenches were uncovered, three connected to wine presses and aligned at right angles to the centre of one side of the treading floors (fig. 1). In each case, two niches appear opposite one another in the long walls of the trenches, which — in those that are attached to wine presses — are at the end close to the wine press. Three pairs of niches are rectangular and one is round.

The details of the trenches are as follows:

- Wine press L131: trench L144, 1.1–0.95×2.4–2.1 m., depth 0.5 m.; round niches with diameter of 0.45 m. (fig. 2)
- Wine press L124: trench L127, 1.15–0.95×2.35 m., depth 0.5 m.; rectangular niches, one 0.4×0.33 m. and the other 0.3×0.3 m. (fig. 4; section 1–1)
- Wine press L140: trench L157, 0.8–0.9×2.2 m., depth 0.4–0.7 m.; rectangular niche 0.55×0.33 m. (other niche damaged)
- Trench L113 (apparently not connected to a wine press; see fig. 1): 0.95×0.22 m.; rectangular niches 0.40×0.25 m. (fig. 3)

These trenches were almost certainly part of lever-and-drum presses (fig. 5), the operation of which is clearly demonstrated by pre-industrial examples (see below, Historical Background). The drum was held by the pair of niches. In the case of



Fig. 2. Moshav Habonim trench L144



Fig. 3. Moshav Habonim trench L113



Fig. 4. Moshav Habonim trench L127

round niches, the drum probably revolved within them; in the case of rectangular niches, they probably contained rectangular wooden housings with a round hole in their centre, in which the drums turned. The second method had the advantage of preventing direct contact between the wooden drum and the rough stone, thus avoiding damage to the wood. The bottom end of a rope was attached to the drum, and the top end was attached to the free end of the beam (the 'lever'). The other end of the beam was anchored within a niche in the wall on the other side of the treading floor. Turning the drum with the aid of long hand-spikes that fitted into holes in the drum would wind the rope round the drum, thus shortening the rope and lowering the beam end. This would bring pressure to bear upon the grape skins left after treading, thus pressing out the remaining must. The men who operated the drum would stand in the trench, and the position of the niches at the

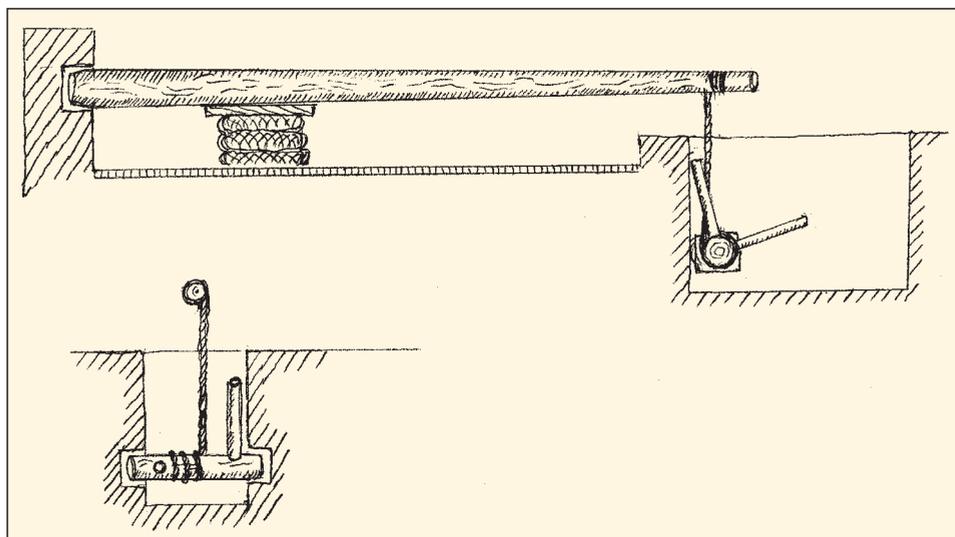


Fig. 5. Reconstruction of lever-and-drum presses from Moshav Habonim

bottom of the trench was ideal both for turning the drum and for maximum lowering of the beam (fig. 5).

The pressing methods in the four wine presses varied. The Roman one, L140, had a lever-and-drum press, but of the Byzantine wine presses, only the southern (L124) and northern (L131) ones had lever presses. When screw presses were introduced, they were placed in only two of the wine presses — the central one (L103), which did not previously contain a press at all, and the southern one (L124), where it replaced the lever press.

THE LEVER-AND-DRUM PRESSES AT ḤORVAT 'AQAV (RAMAT HANADIV)

At Ḥorvat 'Aqav, two wine presses with trenches (there called 'pits' by the excavators) were excavated. They are very similar to the ones from Moshav Habonim, of the same shape and size, in the same position in relation to the treading floor and with two niches in the long side of the trench at the end close to the treading floor (Hirschfeld 2000: 31–36):

- Western wine press L310: trench L324, 1×1.6 m.; niche 0.2×0.2 m. (the other niche did not survive) (fig. 6)
- Eastern wine press L287: trench L304, 0.95×1.45 m.; niches 0.3×0.25 m., 0.2×0.12 m. (fig. 7)

The excavators reconstructed these installations as lever-and-weight presses, in which the beams were anchored with ropes to rods placed in the niches and

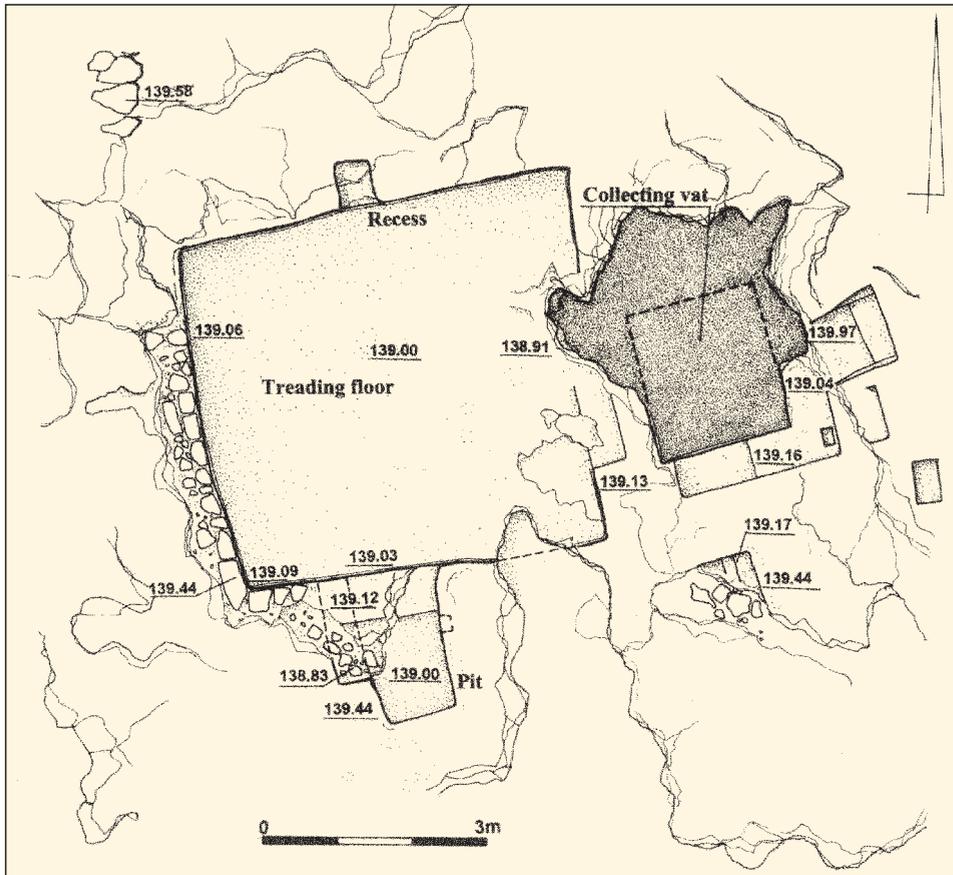


Fig. 6. Western wine press at Ḥorvat ʿAqav (Hirschfeld 2000: fig. 45)

weights were hung on the other end. This interpretation is, however, almost certainly incorrect. There were niches in the walls of the treading floors opposite the trenches (in the western wine press the niche survived; in the eastern one it was reconstructed by the excavators), and the beam (the ‘lever’) was almost certainly anchored in them. As at Moshav Habonim, the trenches would have served to accommodate a drum, which would have lowered the free end of the beam. Admittedly, the niches at Ḥorvat ʿAqav are much smaller than the ones at Moshav Habonim (one of these niches measures 0.2×0.12 m.; once the housing is taken into account, the maximum diameter of the drum would be $0.08\text{--}0.09$ m., which would seem to be somewhat small). This caveat notwithstanding, the great similarity between the installations at Moshav Habonim and those at Ḥorvat ʿAqav leaves little doubt that they operated in the same manner.²

² Wine presses with installations to insert rods were also found in the region of Hazor in

oil and wine. In Israel, lever-and-weight presses first appear in the early Iron Age and were the only type of press in use until the introduction of the screw (Frankel 1999: 51–67, 76–108). They continued to be used alongside more sophisticated devices until modern times (see, e.g., fig. 8). Lever-and-weight presses were the main type not only in the Levant but also in North Africa, southern France, Greece and the Crimea, although the types of weights vary (see Frankel 1999: 99–106, esp. maps 17, 18).

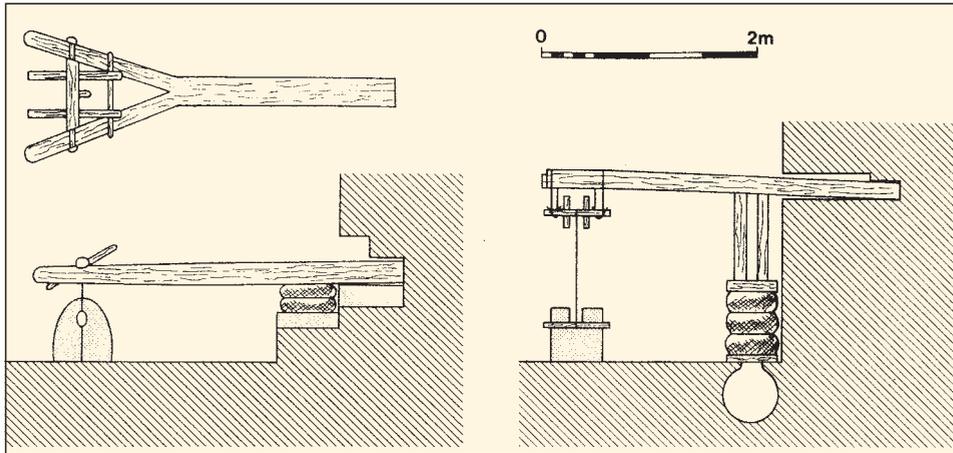


Fig. 8. Pre-industrial lever-and-weight presses at ʿAglun and e-Tafile, Transjordan, c. 1910 (Frankel, Avitzur and Ayalon 1994: fig. 115)

However, in parts of southern Europe — primarily in Italy and former Yugoslavia — the lever-and-weight press was unknown and the type of lever press used was the lever-and-drum press. Cato the Censor, in his book on agriculture, the earliest agricultural manual to survive (from the second century BCE), gives a detailed description of lever-and-drum presses (Cato 18,19; see our fig. 9). Pliny the Elder, summarising the history of the press two centuries later, writes that in the past the press used was the lever-and-drum press (‘our forefathers drew them down by means of ropes leather thongs and hand-spikes’; Pliny, *Naturalis Historiae* 18.74/317). Interestingly, Pliny’s lever-and-screw press raised a box of stones and not a screw weight, as did those in the East and the one described by Hero of Alexandria (for more detailed discussion of Cato’s, Pliny’s and Hero’s presses, see Frankel 1999: 86–88).

The lever-and-drum press probably originally developed from the lever-and-weight press, but the lever press apparently reached Italy comparatively late, perhaps from Greece; thus, in Italy, the stage of the lever-and-weight press was skipped.

In Cato’s press, the drum (*sucula*) revolved in sockets cut in two wooden piers,

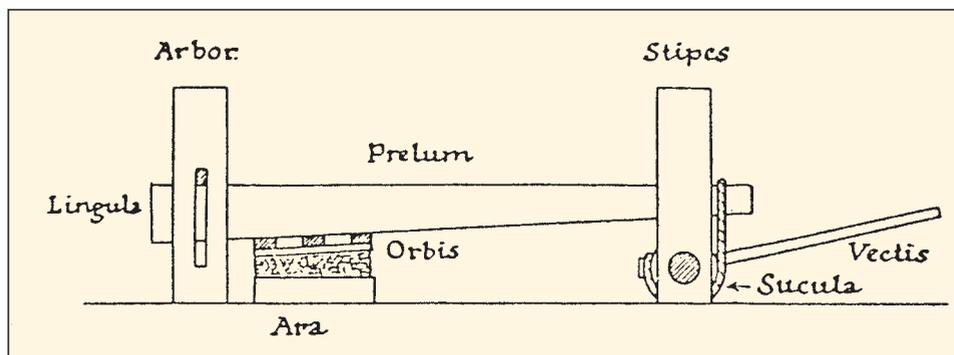


Fig. 9. Cato's lever-and-drum press (Frankel 1999: fig. 8)

one opposite the other (*stipites*; singular *stipes*). Several examples of lever-and-drum presses have been excavated in Europe, but although they vary in the manner in which the drum was held, they all apparently had drum piers, either of wood or of stone, and in no case is the drum held in a manner similar to that at Moshav Habonim and Ḥorvat 'Aqav — in two niches on either side of a rock-cut trench. In two complete presses excavated in southern France, there was a stone base with two square holes that almost certainly held wooden drum piers (Brun 1986: 199–200 [site 89]; 204–212 [site 97]). In a group of presses from Italy, from Pompeii and the surrounding region, the piers were probably of wood, and both the ones that anchored the beam and the ones that held the drum were anchored in vertical shafts sunk into the floor and interconnected below the ground (see Frankel 1999: CD Type 439 for 11 examples). A press of this type was reconstructed at the 'Villa of the Mysteries' at Pompeii (Brun 1986: figs. 11, 12; see fig. 13 for another example; Brun 2004: 20). In former Yugoslavia there are several presses with stone drum piers (e.g., Brøndsted 1928; Brun 2004: 62; see fig. 10). In a recently excavated press, the drum piers are very large and placed in a deep pit so that they would not be too high (Matijašić 2008). In examples from Greece there are small rock-cut holes which held the piers (Jameson 2001; Anderson-Stojanović 2007). For a short general discussion of lever-and-drum presses, with a map, see Frankel 1999: 171–172, esp. map 45 (but note that the examples from Greece are missing both from the discussion and from the map).

Pre-industrial lever-and-drum presses were in use in western Europe until recently, clearly a survival of the type used in the region in antiquity (Frankel 1999: 171–173, esp. map 45). In France, where they were called *casse-coue/cass-coué*, several examples have been described (see, e.g., Humbel 1976: 79–85, figs. 12, 13, pls. XIII, XIV). It was pre-industrial evidence that made it possible to reconstruct the ancient installations and to understand how they operated as is also the case with many other types of installations (e.g., lever-and-screw presses, see Frankel 2010; devices for baking bread, see Frankel 2011).

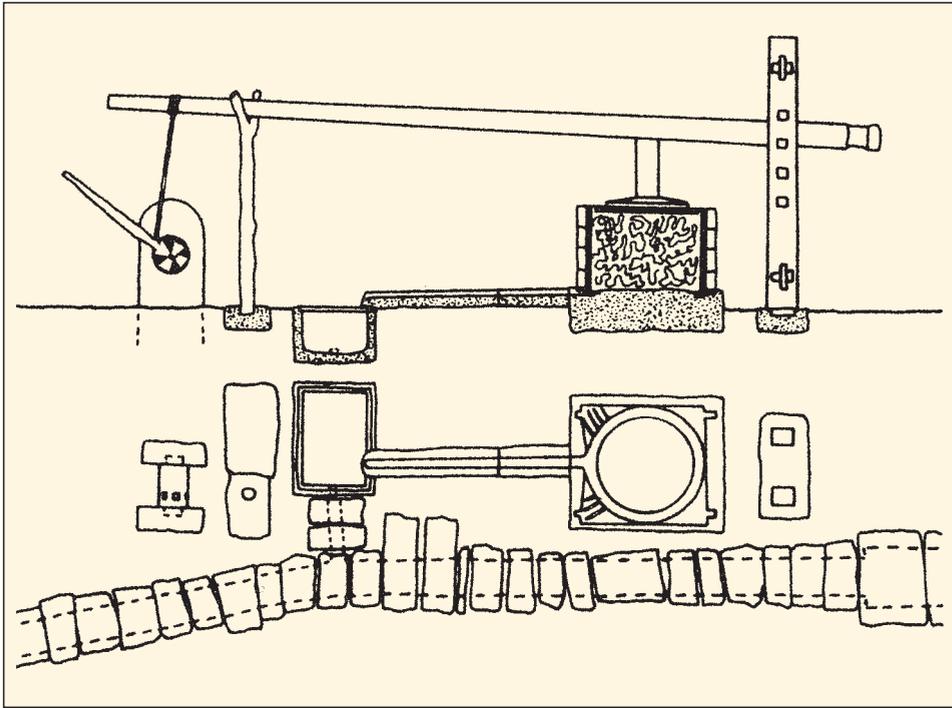


Fig. 10. Lever-and drum press from Salone, Croatia (Brun 2004: 62)

CONCLUSIONS

The lever-and-drum presses at Moshav Habonim and Ḥorvat ʿAqav are apparently the first installations of this type to be reported from the southern Levant. They are also, to the best of our knowledge, the first lever-and-drum presses known anywhere in which sockets on the sides of a rock-cut trench hold the drum. The two sites are near one another, and both are near the coast. Apparently, knowledge of the existence of lever-and-drum presses reached the region from Europe, probably from Roman Italy, but without detailed information; consequently, a unique type was invented.

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