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When a group of LDS scholars collaborated in 1994 under the auspices of the Foundation for Ancient Research and Mormon Studies to publish a book on the allegory of the olive tree in Jacob 5,[1] few substantial works on olive production in the ancient world existed. Now, two new archaeological books add a wealth of information to our understanding of the importance of the olive in ancient life.[2] Although expensive and technical, these new volumes offer further insights for anyone interested in olive culture as reflected in the scriptures, especially in the Book of Mormon.

The first mention of the olive in the Book of Mormon is found in Lehi's prediction of the Babylonian captivity and the coming of the Lamb of God. Lehi compared the house of Israel to an olive tree whose branches would be broken off and scattered upon all the face of the earth (1 Ne. 10:12). After being scattered, the house of Israel would be gathered and the natural branches of the olive tree, or the remnants of the house of Israel, would be grafted in, or come to a knowledge of the true Messiah (1 Ne. 10:14). In this passage, Lehi probably drew upon Zenos's allegory, found on the plates of brass. In incredible horticultural detail, that allegory compares the house of Israel to an olive tree. Yet that Old World information was apparently lost among Lehi's descendants in the New World. After the fifth chapter of Jacob, the olive is not mentioned again in the Book of Mormon.

Although there are thirty to forty—some say up to four hundred—species of olive (*Olea*), the cultivated (tame) olive (*Olea europaea* L.) and the wild olive (*Olea europaea* var. *oleaster*) are the only ones of concern from a scriptural point of view. The cultivated, or tame, olive possibly originated in the Eastern Mediterranean and then spread westward. The cultivated olive has larger fruits with a smaller amount of the bitter glucoside, oleuropein. Cultivated olive species are developed by choosing the best olive trees among the wild species; the trees are selected for desirable growth patterns and fruit quality. This selective breeding has been going on throughout the ages and is still being done today. After centuries of domestication and selection, the differences between the domesticated (tame) and nondomesticated (wild) are normally very apparent, although there are obviously intermediate types.

Since these domesticated forms readily cross with the wild forms, resulting in a wide range of genetic variation, it is not desirable to grow new trees from seeds. Thus, the standard procedure used to propagate

Courtesy Doris R. Dant

FIG. 1. This olive tree in Israel shows abundant evidence of grafting and pruning. The age of such trees cannot be determined because as olives regenerate, the inner portion of the stem decomposes, disrupting the continuity of tree rings.

desirable plants was, and still is, planting cuttings. The olive is one of the easiest trees to propagate by this means. Olive growers normally use wild olive grafts only to rejuvenate domesticated or tame trees; tame trees are also grafted onto the roots of wild trees to give the plants more vigor. For these reasons, it is not likely that Lehi's group brought olive seeds with them to the New World. They may have attempted to bring cuttings, but even if they did so, the cuttings probably did not survive the long journey.

Another important point is that olives require a specific ecological setting to grow and reproduce. Olive trees thrive all around the Mediterranean. Low humidity, moderately cold winters, and long, hot summers are important. Temperatures cannot go below -11°C (12°F) or the plants will be killed. They grow well on moderately poor, rocky soil if they are given proper care. They prefer well-drained hillsides as they cannot survive if water stands around their roots. The trees grow between the latitudes of thirty to forty-five degrees and up to 550 meters above sea level, although some cultivars will grow at altitudes up to 600 meters or even higher on southern exposure slopes.

Of the many olive groves growing around the Mediterranean, the most memorable location that I have seen is near Delphi in Greece. There one can see what is perhaps the largest olive grove in the world. Tens of thousands of trees grow on the fertile plain below Delphi adjacent to the Mediterranean Sea, extending all the way up the hillside beyond Delphi, which is approximately 650 meters above sea level. Near Delphi, on the southern slopes of the hills, the wild and tame trees meet. Large trees with fat olives can be seen adjacent to small, bushy trees with small olives.

The relatively specific growing requirements for olives severely limit where they can grow. There are only a few areas in the New World that fit these specific growing conditions. They are mostly confined to limited areas in California, Arizona, Chile, and Argentina. Here is another reason why, even if Lehi and his followers had brought cuttings, the starts were not likely to have survived.

Many aspects of olive culture are relatively specific, and most are discussed in detail in earlier publications,[3] where examples of botanical knowledge during biblical times are also described.[4] The ancients knew how to nourish a vineyard, how to keep a vineyard from decaying, how to prune a tree in relation to fruit production, how to initiate young and tender branches, and how to keep the roots balanced with the foliage. The ancients also knew that there were wild (undesirable) and tame (domesticated or good) trees and that there were advantages and disadvantages of each. They knew that land could be poor (evil) or good, but that proper nourishment was necessary in either case. And they knew that, if the foliage of otherwise healthy trees was removed, the roots might perish. These details

add significantly to our understanding of how Zenos used various aspects of olive culture to convey his profound and well-known message about the history of the house of Israel. The allegory has received various interpretations; my own interpretations are discussed in an earlier publication[5] and generally agree with the interpretations of Monte Nyman.[6] I will focus here on contributions made to our knowledge by the information contained in the two new volumes.

Objectives and Conclusions in *Olive Oil in Antiquity*

The volume *Olive Oil in Antiquity: Israel and Neighbouring Countries from the Neolithic to the Early Arab Period*, edited by David Eitam and Michael Heltzer, contains twenty-nine articles written by thirty authors. The book is the result of a conference in Israel specifically about olive oil production and use. The subject gained interest in Israel after evidence of oil production was found at several archeological digs, especially at the ancient city of Ekron, which had a large-scale operation. The book points out the importance of olive oil for man's survival in ancient Israel, as "the fruit and its oil were major components in his diet." Oil was the "main source for [lamp] light and a basis for the manufacture of cosmetics and medication." Oil was also "used for oiling, . . . for kindling the *menorah*, for offerings and for anointment of kings and priests." Eitam and Heltzer state that the research on olive oil in antiquity will broaden our understanding of "the ancient economy, . . . social structure, [and] geopolitical relations" (1).

Production and Botany. One contributing scholar maintains that olives appeared in Israel "about 45,000 years ago" but "were most probably not cultivated until the Chalcolithic period," 4000–3000 B.C. Another contributor asserts that people "ate from the fruit of the olive tree even before [they] knew how to preserve it or to remove the bitter taste" of glycosides. Prehistoric dwellers in Mount Carmel and Galilee "knew of the olive and enjoyed its fruits" by 10,000 to 6,000 B.C. In fact, archeological evidence shows that "Israel may very well have been the birthplace of the cultivated olive" (7, 29).

The research presented in this book points out the importance of domestication: "Wild olives are allogamous [reproducing by cross-fertilization], reproduce entirely from seeds, and show a wide range of [genetic] variation. In contrast, domesticated olives are cultivated as clones," a practice that provides genetic uniformity. The two important characteristics that set domesticated olives "apart from their wild relatives are large fruit-size and higher oil-content. . . . In the Mediterranean basin, olives constitute a complex of wild forms, weedy types, and cultivated varieties." The thousands of years of cultivation of the olive tree in the land of Israel and the Middle East created rules and rituals for tending olive orchards. The success

of the trees depends upon climatic conditions, precipitation, irrigation and cultivation methods, treatment of the seedlings, growing of the stock, and preparation for grafting and pruning. Many olive trees that are one thousand to two thousand years old still stand in Galilee, Judea, and Samaria (6, 8–9, 29–39).

Area/Period Studies. In *Olive Oil in Antiquity,* scholars report on the importance of olive oil in various geographical areas during ancient times.

Israel. Biblical writings imply the importance of the olive tree and its oil to the society located on the eastern shores of the Mediterranean. The olive is also a common topic in other Jewish works and in Christian, Gnostic, and Islamic writings. Olive oil was "symbolic of dignity," and an anointing with oil was symbolic of a change in status throughout the Near East. Oil was also "an item of charitable donation." In addition to the use of olive oil for food and for light, oil was used in the manufacture of soap and, less commonly, in crafts including painting. In religious life, "olive oil was used for . . . purification ceremonies, [and] individual meal offerings." Commonly, the meal offerings were "grain or flour mixed with oil to which frankincense was sometimes added." These offerings "were intended to achieve a sweet odor before the divinity . . . and to 'gladden the heart' [Prov. 27:9]." The Bible contains "several examples of the ancient custom of pouring oil on sacred stones" (55, 56, 60–62, 125, 126).

According to the Mishnah, the oil press (and storehouse) were "an integral part of . . . an agricultural settlement." Jewish sources from 200 B.C. to A.D. 500 also make it clear that olives were commonly spread on the roofs of homes "to expose [the olives] to the sun" for softening. In Israel during the Bronze and Iron Ages, a clay jug or a jar was used to store olive oil. To prevent the ceramic containers from "letting liquid out and allowing oxygen in," the populace in some areas applied lime plaster or a "thick light-colored wash" to the jars. A decoration called combing was also used during firing to strengthen the jars. There is evidence that every seven years, "less sophisticated methods for the production of oil" were used because of a directive to "'act during the Sabbatical year as the poor people act'" (115, 116, 45–48, 118).

The economic impact of oil production was profound: "the oil produced was intended for sale or export outside the confines of the settlement and, most likely, outside the immediate region. . . . The production of oil provided profits amounting to almost twice the cost of living, [implying] a high standard of living" (123).

Egypt. The study on olive oil in Egypt focuses on the words used in ancient documents. "The Semitic loanword for olive, *zayit*, is known from Egyptian documents beginning in the Nineteenth Dynasty, from the reign of Merneptah." Documents show that in the Twentieth Dynasty, Ramses III

planted olive groves, although "the hot, dry climate of Egypt does not favour the olive tree and its cultivation on a large scale" (41).

Greece and Cyprus. The study on Greece asserts that "for most areas of Greece olive cultivation was not practiced intensively until the end of the Bronze age." In Cyprus "the earliest stratified evidence of olive oil extraction dates to . . . ca. 1300 B.C." The Knossos Linear B tablets mention two kinds of olives; nonetheless, scholars believe that the oil was obtained from wild instead of domesticated olives—since "the olive was cultivated rather late in the Aegean, . . . the olive oil industry of the Minoans-Mycenaens relied heavily on the wild olive." However, they used oil for perfume and unguents and seem to have been more interested in the industrial uses of oil than the nutritive (64, 49–52).

Ugarit. Ugaritic texts tell us that "the main source of oil in Ugarit was 'olive oil.'" In Ugarit the olive stones were quite similar to those of modern domesticated olives, being "about one-third larger than the Greek stones." Documents give evidence that "hired laborers and carpenters received oil from the stock of the royal household," and taxes were paid in oil. During work, "oil was a component of the food rations." One Ugaritic text hints at "the possibility of foreign trade in oil between Ugarit and other countries" (77, 79, 84, 89).

Mesopotamia. This study surveys the mentions of olives in cuneiform documents. Unfortunately, the evidence reveals only a few items I found interesting: "The name of the olive tree and its products occurs in a number of written forms, which seem to vary according to time and place." "The earliest [written] occurrences of this tree and its products are in the Ebla texts. . . . In the third millennium [B.C.] sources from Mesopotamia proper[,] only scattered allusions to the products of this tree (wood and oil) are found." "It is common knowledge that the olive tree was not native to Mesopotamia and was never cultivated there." "Imported olive products may well have been expensive." "Olive oil was an especially luxurious perfume used, only on a very special occasion," and a small portion was destined to anoint the king. "There is no evidence for the use of olive oil for industrial purposes, . . . purification or illumination" (92, 94, 95, 97, 100).

North Africa. Olive culture may have begun in North Africa soon after the foundation of Carthage by Phoenicians. Most scholars agree that even though "the wild olive . . . is found in North Africa, . . . skills for cultivating the olive as well as the original olive scions . . . came from the East and were culturally transmitted by the Phoenicians or the Greeks." By the fourth century B.C., Carthage produced enough olive oil to meet its own needs. Soon after the Romans established themselves in Africa, oleoculture was practiced intensively. The Roman scholar Pliny noted that "it is peculiar to Africa that it grafts them (olives) on a wild olive, in a sort of everlasting

sequence." He was reporting on the Africans' practice of grafting a new branch when an existing branch grew old. In this way, the same tree would grow for generations. Studies are still being conducted in attempts to determine the extent of the olive trade during the time of the Roman Empire (130, 131, 129, 134).

Archaeological and Technological Studies. Interesting new evidence has also come forth from various archaeological studies. For example, many "underground olive presses dating from the Hellenistic period onwards have been found in the Judean Shephelah." One of them was found "in a large underground room . . . connected to the surface by a stepped passage that enabled easy access and operation." Another press, found in the Plains of Sharon, was used from "the Late Roman and Byzantine periods, continuing into the Early Arabic period." Presses were also found at Hirbet Sumaka, "a Jewish settlement from the Roman and Byzantine periods, and at Tel Batash, the biblical Timnah" (137, 149, 157, 243). One study compares oil presses excavated in Western Galilee to those in Judea (197–218). The book provides excellent figures and relates archaeological finds to cultural practices.

The Tel Miqne–Ekron oil industry in seventh-century-B.C. Israel is discussed at length. The 115 oil-press complexes found at ancient Ekron represent more than 30 percent of the total number of Iron Age oil-extraction installations discovered in Israel. Even though only about 2 percent of the site has been excavated, it is evident that the industrial zone took up at least 20 percent of the Stratum IB-C city, the largest olive oil production center found in the Near East (219–42).

Another impressive site is Maresha in Israel. The site has numerous underground caverns, and sixteen oil-pressing plants there have been studied. In its prime during the Hellenistic period, Maresha boasted sixteen olive-oil production facilities and 445 acres of olive groves. Maresha produced oil far in excess of its own needs; archeologists think that the city exported oil to Egypt. During the Roman-Byzantine periods, another famous high-capacity area was the Golan (257, 276, 277, 301).

In the hilly country of Manasseh, over a hundred sites with Iron Age I pottery have been studied to determine the olive economy during the Israelite Settlement period: "Assuming an average yearly crop of 25 kg of olives per tree, this producing 5–10 kg of oil, we arrive at 10–15 trees, on one *dunam* [1000 square meters, or about one-fourth acre], per household. This is the situation in the traditional Arab village today." This figure suggests that "31 *dunams* of olive trees would have sufficed for [a village's] own consumption." However, the exchange of oil for other products probably "compelled hill-country villages to double or triple their . . . lands. If we [assume] 100 *dunams* of olives per village, we arrive at a total area of 3,000 *dunams*

of such groves in the 11th century B.C." (308, 310, 311). This considerable amount is another indication that olive culture was very important in ancient Israel.

Conclusion. The evidence in *Olive Oil in Antiquity* shows that the center of activity for ancient olive culture and production was probably Israel. The findings discussed by the contributors of this book support the botanical references to the olive tree in Jacob 5. Since olive culture has been so important throughout the history of Israel, one can readily understand why some ancient prophets used the olive in their religious analogies.

Objectives and Conclusions of *Wine and Oil Production in Antiquity*

In *Wine and Oil Production in Antiquity in Israel and Other Mediterranean Countries*, Rafael Frankel draws his conclusions from "a geographic catalogue of over 3700 [agricultural] installations" for wine and oil production "from over 700 sites in Israel and from a similar number of sites from other countries. They date from the earliest times up to pre-industrial [times]" (back cover). The catalogue itself is provided on a compact disc supplied with the book.[7] With a primary theme of regional diversity, Frankel argues that three aspects of his study are distinctive: "the wide chronological range examined"; "the wide geographical area covered" (which "includes the whole of the Mediterranean Basin and the surrounding countries"); and "the catalogue of installations on which the research is based [which] is not limited to those from clearly dated stratified contexts but includes many undated finds from surveys" (25).

General information about olives, particularly as related to Jacob 5, can be found in the introduction and the four very informative "preambles," or surveys (25–50). The book's main chapters concentrate on evidences for the ancient technology of oil production, namely "Simple Installations," "The Simple Lever and Weights Press" (fig 2), "Olive-Crushing Devices," "The Improved Lever Press," "Beam Weights," "The Lever and Screw Press," and "Direct-Pressure Rigid-Frame Presses."

Frankel provides many points of interest. For example, several scholars have indicated that it is "virtually impossible to distinguish between the wood, stones or pollen of the wild and the cultivated olive." The amount of olive wood found in the archaeological record increased "sharply during the Early Bronze Age [which] suggests [the] beginning of olive cultivation at this period"; however, there is evidence that "olive cultivation almost certainly started before the Early Bronze Age" (36).

Linguistic evidence suggests that olive domestication may have originated in more than one geographical location. For *wine*, the terms used in the Semitic and Indo-European languages clearly derive from a common

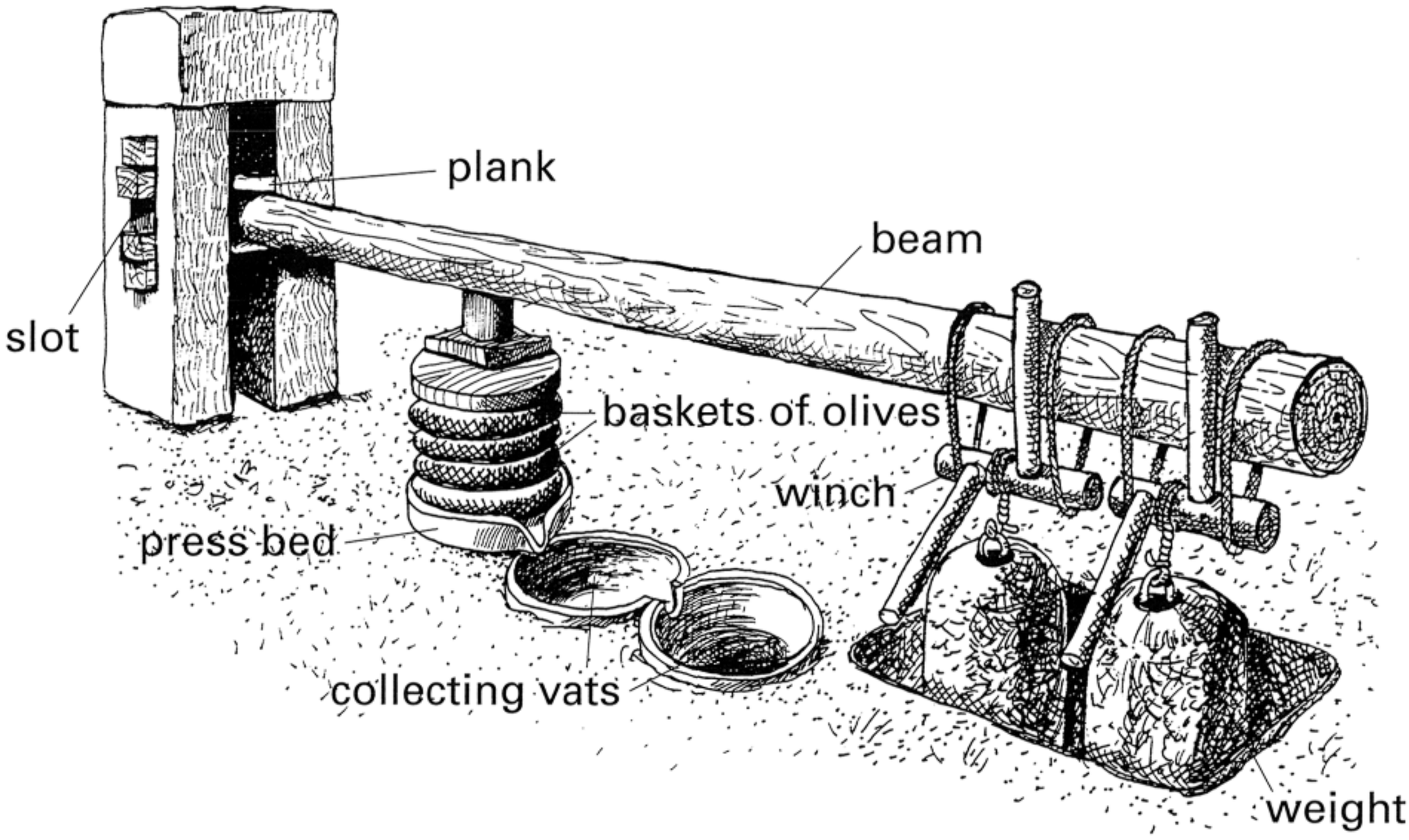

Fig. 2. An ancient lever-and-weights oil press excavated at Khirbet Zibdi, Israel. The oil was separated from the heavier lees when the oil flowed from the first collecting vat to the second. Drawing by Shlomo Sawady; text added. Courtesy Eretz Israel Museum, Tel Aviv, Israel. From Rafael Frankel, Shmuel Avitsur, and Etan Ayalon, *History and Technology of Olive Oil in the Holy Land* (Arlington, Va.: Olearius Editions; Tel Aviv: Eretz Israel Museum, 1994), 41.

source. With *olive* and *oil,* this is not the case. The Semitic root for *oil* is similar in Ugaritic, Hebrew, and Akkadian. The same is true for *olive.* However, in Egyptian and Greek the roots are different from the Semitic and from each other. Frankel also shows evidence for independent olive domestication on Crete, based upon stone size, although some authors question the use of stone size as an indication of domestication (36).

Olives have been grafted since before recorded history. A method which is still practiced in Israel today is to use wild olive saplings taken from the forest as root stock and graft them with scions from a particular tree known to be fruitful. Interestingly, since olive trees live to a great age, the center of the tree trunk may decay and become hollow. Since tree rings cannot be counted, it is difficult to determine a tree's exact age (37).

The size of ancient olive harvests was not very different from harvests today. "In Galilee today, olives are usually planted at 10 m intervals," resulting in one hundred trees per hectare. In Greece the density "reaches 120 trees per hectare, in Spain 90, in Italy 85, and in Libya, in desert conditions, only 30. (See fig 3.) The yields of unirrigated olives in Israel today are 800 kg—3 tonnes per hectare or 8–30 kg per tree—although in exceptional cases a

FIG. 3. These olive trees stand on a hillside in the eastern Mediterranean region, a major olive-producing area for centuries. These trees have been planted with room for growth and cultivation. Olives flourish in rocky areas with ample light and adequate moisture. Regular pruning is required, and good orchards are kept free from weeds and trimmings.

tree will give as much as 50 kg." Experts estimate that in ancient times the yields of olives were "7–30 kg per tree and between 700 kg and 3 tonnes per hectare" (37).

Although today olive oil is used for little other than cooking, the utility of olive oil in antiquity was seemingly endless. Frankel sheds additional light on those uses. In Mesopotamia, in the Hittite culture, and in the Mycenaean world, its main use was "as an unguent or as a basis for the production of perfumes and similar cosmetics." Perfumed oils are also mentioned in the Hebrew Bible. Other practices involved men anointing "their heads and beards with oil" and women receiving beauty treatments of oil "enriched with myrrh." Greeks cleansed themselves by applying olive oil to their bodies and then scraping "off the oil, sweat and dust with a special sickle-shaped instrument known as a strigil." Industrial purposes included textile processing and tanning, the production of soap, and ritual (43, 44).

After oil was separated, a black fluid was left—the lees. Lees were used to fertilize olive trees, "to kill noxious weeds . . . to smear on vines to keep out insects . . . to make an infertile olive [tree] bear fruit," and "to protect grain from insects and mice." Lees were also used to soak firewood, to repel moths, to prevent the decay of wood and polish it, and to improve the health of cattle (45–46).

The triad of foods—corn (wheat or grain), wine, and oil—is mentioned eighteen times in the Bible, even though "there are few specific references [to the use of olive] oil as food" (45). One reference to oil as food is in Ezekiel 16:13. Reported miracles indicate oil's use across socioeconomic classes:

> Miracles both of Elijah (1 Kings 17:8–16) and Elishah (2 Kings 4:1–7) are connected to increasing a quantity of olive oil suggesting it to be a valuable product but also showing it to be expected that a simple family would have some oil for food in their home. . . . Limited data suggest that in Iron Age Judaea and Israel and Late Bronze Age Ugarit olive oil was a staple product of importance, although probably not available to the poorest part of the population. (45)

Summary

These two publications sustain many already known insights and also provide new insights into olive culture and use anciently. Much of their information confirms and elucidates details in Jacob 5 and stands behind the comparison of the olive tree to the history of the house of Israel. From such studies, modern readers may apprehend key meanings, especially when understanding such points as the great antiquity of the plant and the prominence of the olive in ancient times; the reference to two different kinds of olive (domesticated and wild) found anciently in different geographic

areas; the practice of domestication through the selection of desirable plants from wild populations of plants; the grafting of wild or nondomesticated plants to give vigor to the domesticated plants; the significance of grafting and pruning even before recorded history; the unlimited life span of the olive tree; the ancient ritual of anointing with olive oil; the widespread use of olive presses of various kinds in diverse geological settings throughout ancient history, indicating how the olive was valued throughout the Mediterranean basin; the suggestion that the center for olive culture and production anciently was possibly Israel; the integration of olive and olive oil in the ancient cultures of the Mediterranean basin; and the use of olive oil for a variety of important purposes anciently.

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1. Stephen D. Ricks and John W. Welch, eds., *The Allegory of the Olive Tree* (Salt Lake City: Deseret Book and FARMS, 1994).

2. David Eitam and Michael Heltzer, eds., *Olive Oil in Antiquity: Israel and Neighboring Countries from the Neolilthic to the Early Arab Period* (Padua: Sargon, 1996); Rafael Frankel, *Wine and Oil Production in Antiquity in Israel and Other Mediterranean Countries,* JSOT/ASOR Monograph Series 10 (Sheffield, Eng.: Sheffield Academic Press, 1999).

3. Wilford M. Hess, "Botanical Comparisons in the Allegory of the Olive Tree," in *The Book of Mormon: Jacob through the Words of Mormon, to Learn with Joy*, ed. Monte S. Nyman and Charles D. Tate Jr. (Salt Lake City: Bookcraft, 1990), 87–102; Wilford M. Hess, Daniel J. Fairbanks, John W. Welch, and Jonathan K. Driggs, "Botanical Aspects of Olive Culture Relevant to Jacob 5," in *The Allegory of the Olive Tree,* ed. Ricks and Welch, 484–555. There are several chapters, and all deal with various aspects of Jacob 5. This relatively extensive botanical chapter deals, in detail, with ancient and modern olive culture.

4. Hess, "Botanical Comparisons," 87–102.

5. Hess, "Botanical Comparisons," 97–101.

6. Monte S. Nyman, *An Ensign to All People* (Salt Lake City: Deseret Book, 1987).

7. The CD ROM is for MAC and PC computers and contains Acrobat Reader. However, Acrobat Reader must be updated to be compatible with the MAC OS 9 operating system. The CD ROM contains three lists: List A is of sites and installations (181 pages). List B is of installations according to type (223 pages). List C is an alphabetical list of sites-site indexes (43 pages).