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ZOHAR AMAR, RAM BOUCHNICK AND GUY BAR-OZ,
THE CONTRIBUTION OF ARCHAEozoology TO THE IDENTIFICATION OF THE RITUAly CLEAN UNGULATES MENTIONED IN THE HEBREW BIBLE
THE CONTRIBUTION OF
ARCHAEOZOOLOGY TO THE
IDENTIFICATION OF THE RITUALLY
CLEAN UNGULATES MENTIONED IN
THE HEBREW BIBLE

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INTRODUCTION

Deut 14:4–5 lists ten clean ungulate species whose flesh is permitted to be eaten:

זֹ֥את הַבְּהֵמָ֖ה אֲשֶׁר תֹּאכֵ֑לוּ שׁ֕וֹר שֵׂ֥ה כְשָׂבִ֖ים וְשֵׂ֥ה ﬠִזִּֽים׃
אַיָּ֥ל וּצְבִ֖י וְיַחְמ֑וּר וְאַקּ֥וֹ וְדִישֹׁ֖ן וּתְא֥וֹ וָזָֽמֶר׃

These are the beasts which ye may eat: the ox, the sheep, and the goat; the ʾayyāl, the ṣěbî, and the yaḥmûr; and the ʾaqqô, the dišôn, the têʾô, and the zemer.1

On the other hand, the pig, the camel, the hare, and the hyrax are animals whose flesh is forbidden. The significance of this text is

1 We have chosen to present the original Hebrew names of the clean animals under discussion as they appear in the HB, and not as they appear in modern translations that are often subjective interpretations.
that it presents the most comprehensive list of ungulates that were
eaten at the time. Of those listed, the first three species are domes-
ticated livestock: the ox (*Bos taurus*), the sheep (*Ovis aries*) and the
goat (*Capra hircus*), whose identification is unquestionable. The
identification of the remaining seven ungulates is not clear, and
various names have been proposed over the last few centuries (see
Table 1). Several academic methods have been developed in recent
years for identifying the flora and fauna mentioned in the HB.
These identifications rely on inter-disciplinary research, which in-
cludes analysis of the literary contexts of the biblical texts, compar-
ison with contemporary cultures in the Near East, traditional trans-
lations and ancient interpretations, bio-geographic analysis, and
archaeological finds.

The aim of this essay is to highlight the potential contribution
of archaeozoological research in the southern Levant to the identi-
fication of the seven clean, wild ungulates. We will first present
evidence for the abundance of clean, wild ungulates from archaeo-
logical sites, and then we will approach the biblical texts in a way
informed by archaeozoological data. Hundreds of archaeological
sites have yielded thousands of identifiable and identified wild un-
gulate bones, but such an extensive corpus of data has not been
used to advance the identification of these seven clean, wild ungu-
lates. In particular, we maintain that the significant amount of re-
cent archaeozoological data from the Late Bronze to the Persian
period sites (hereafter, LB-PP sites) in the southern Levant pro-
vides us with a qualitative indicator to examine the relative abun-
dance of wild ungulates. This indicator, in turn, enables us to pro-
pose some of the tentative identifications.

Although the references to fauna and flora in the HB reflect
the realia of the entire Fertile Crescent, most of the references deal
with a narrower geographic region that partially overlaps the terri-
tories of present day Israel, the Palestinian Authority, and the
Kingdom of Jordan (i.e., the territory from Dan to Beer-Sheba; cf.
Judg 20:1; 1 Kgs 5:5). In this article we will use the term “southern
Levant” for this area. Our study incorporates archaeozoological
data from 133 LB-PP sites from this region. We will also draw
comparisons with the findings from ancient Mesopotamia and
Egypt as necessary. Finally, of course, a significant number of texts
in the HB reflect knowledge of the existence of and familiarity with
the fauna which we are studying (e.g., Deut 12:15–22; 1Kgs 5:3).

**CLIMATE CHANGES**

Several researchers have shown that there have been no major
climatic changes in the area since ancient times, apart from margin-
al regions in the south, where climatic conditions were moister and
cooler than those prevailing today. In spite of an increasing human
impact on the environment, we have assumed that there have been
no significant changes in the agricultural landscape of the country
(Liphschitz 1986: 80–90; Lev-Yadun 1997; Baruch and Bottema
It could also be that the presence of Mediterranean wild animals in marginal and arid areas may hint at the role of trade and import of meat. Though some of the large ungulates became extinct during the periods relevant to this study, it is most probable that this resulted from direct human interference (i.e., habitat destruction and degradation) (Tsahar et al. 2009).

**CLASSIFICATION**

Clearly and for obvious reasons, the taxonomy implied in the HB is different from any modern scientific classification. A major principle in the classification method reflected in the HB is to organize the clean animals into general groups according to distinct morphological and behavioral criteria, with no relation to anatomic or genetic affiliation (Dor 1997: 10-20). We can narrow the list of animals to those that have three distinct criteria for cleanness:

כֹּל מַפְרֶסֶת פַרְסָה וְשֹׁסַﬠַת שֶׁ֨סַע פְּרָסֹ֔ת מַﬠֲלַ֥ת גֵּרָ֖ה בַּבְּהֵמָ֑ה
אֹתָ֖הּ תֹּאכֵֽלוּ׃

Any animal that has divided hoofs and is cleft-footed and chews the cud—such you may eat (Lev 11:3, NRSV; cf. vv 4–8).

It could be that each of the listed clean animals in the HB represents a special taxonomic group with its own significant characteristics (Kislev 2000: 216–225).

**FREQUENCY AND ORDER OF ANIMALS MENTIONED IN HB.**

As mentioned above, the system of animal classification reflected in the HB does not correspond to the categories of modern science. It is possible also that certain animals were not mentioned. Nevertheless, the number of references to animals is significant. We assume here that there is a direct correlation between the number of references to an animal and either the extent of its population in the area or its importance; the more an animal is referred to in the texts, the more this species was common or important for some particular reason. In the case of the clean ungulates, it is also reasonable to assume that their order is meaningful. These assumptions are further examined below.

**IDENTIFICATION OF THE CLEAN, WILD UNGULATES IN LIGHT OF PAST TRANSLATIONS AND INTERPRETATIONS**

A summary of the various identifications for the seven Biblical clean, wild ungulates is given in Table 1, with their names in biblical Hebrew, Aramaic, and Arabic translation. There are considerable discrepancies in the names of the animals in the translations, and in many cases the original name has been lost. The name of the
animals in English are cited according to the KJV (1611) and the RSV. The identification of the animals represented in these translations does not always correspond to those advanced by modern scholars (e.g., Gerstenberger 1996: 129–130; Milgrom 1991: 643–648). The conclusions of the researchers reflect a refinement of all of the various translations and interpretations that were available to them as well as additional information. A summary of the major different identifications will appear in the updated scientific terminology, according to the probabilistic ranking that emerges from most of the translations and studies. From the profusion of studies which summarize the subject, we have focused principally upon: Lewysohn 1858; Wood 1869; Tristram 1884; Aharoni 1935: 107; Aharoni 1943–1946: 103, 239–255; Bodenheimer 1950; 1953; Bilik 1961: 28–31; 1979: 324–329; Cansdale 1970; Levinger and Dor 1975: 37–49; Felix 1984; Dor 1992: 122–130; Borowski 1997. In addition we were influenced by studies that dealt with lists of these animals from an anthropological viewpoint, some of which emphasized the symbolic aspect (Douglas 1966) and some of which made use of the archaeozoological finding (Houston 1993).

ARCHAEOZOOLOGICAL FINDS OF CLEAN UNGULATES IN THE SOUTHERN LEVANT

Animal bones unearthed in archaeological sites in the southern Levant provide an important source of information on past animal presence and distribution. In this study we have incorporated archaeozoological data from LB-PP sites (15th–5th centuries BCE; see Table 2). In fact, the majority of finds derive from the Iron Age (12th–7th centuries BCE), and represent a period of occupation in the area which was much more intensive than the others (see Table 3). We acknowledge that the pattern observed may be also distorted by the fact that the major research efforts have concentrated on the cultural phases of the Iron Age. Table 3 also shows the distribution of the different clean ungulates according to their geographic origin. This allows us to view their overall past distribution, and to evaluate the possibility that certain species were imported.

The database of archaeozoological research of the southern Levant includes faunal reports that originate from different sample sizes and site types (bone refuse from settlements, and sacrificial and ritual sites or animal offerings in burial deposits). Animal bones that could not have been associated with a specific cultural entity or distinct period were not included. The rich accumulation of archaeozoological finds allowed us to draw several broad conclusions. Comparison between Tables 2 and 3 highlights the similarity in distribution and abundance of species.

One drawback of archaeozoological research is that it is difficult to distinguish between closely related species based on morphological criteria. For example, it is difficult to differentiate between gazelle species (Gazella sp.), in particular between the moun-
tain gazelle (*Gazella gazella*) and dorcas gazelle (*Gazella dorcas*), which differ only slightly in the shape of their horns, but not in the shape or size of other skeletal elements. Since gazelle horn cores are only rarely found complete, it is difficult to distinguish between them. Identification based on zoogeographic distribution is also not a straightforward task, as the distribution of the dorcas gazelle changed during the Holocene (Tchernov et al. 1986/87: 51–59). It is also almost impossible to distinguish wild sheep (*Ovis orientalis*) and wild goat (*Capra aegagrus*) from their domesticated species; thus one must be very cautious with their identification in archaeological sites, although we cannot ignore the fact that these animals were part of the local fauna in historical times.

**RESULTS AND DISCUSSION**

אַיָּל וּצְבִי ʾayyūl and šēbī

There is no doubt that the šēbī can be identified with the gazelle species: mountain gazelle and dorcas gazelle. The ʾayyūl is identifiable with the cervid species which live in the Mediterranean regions of the southern Levant: Mesopotamian fallow deer (*Dama mesopotamica*), red deer (*Cervus elaphus*), and roe deer (*Capreolus capreolus*). These were the common clean ungulates in the southern Levant at the time. The number of references to these species in the HB reinforces this assumption: the ʾayyūl is mentioned 21 times, while šēbī is mentioned only 12 times. It could be that the ratio of these references is coincidental, according to the need and choice of the Biblical writers, but according to the interpretation of the archaeozoological find, it emerges that this does faithfully reflect the deep imprint made by these animals on the landscape of the land of at that time.

The textual sources that discuss the rules of eating clean ungulates demonstrate a similar pattern (Deut 12:15–22; 14:5; 15:22; 1 Kgs 5:3). Thus it appears that these were the most common wild game in the diet of the ancient Israelites. This is supported by the archaeozoological research which indicates that these are the most abundant species in archaeological sites (see Table 3: 60 sites with deer bones, as opposed to 51 with gazelle bones; also Table 2: 72 sites with deer bones, compared with 86 sites with gazelle bone).

Analysis of the spatial distribution of fallow deer reveals that it was common in all parts of the country. In fact, its presence may have expanded beyond its original distribution, as perhaps indicated by its appearance in the sites of Tel Masos (Tchernov and Drori 1983: 213–222), Tel Beer Sheba (Hellwing 1984: 105–115), Tel Ira (Dayan 1999: 480–494) and Lachish (Croft 2005: 2291). Most of the archaeozoological finds from these sites, as well as from other sites in the country, are referred to as elite foods consumed by the site’s administrators or governors. Given the tasty flesh of deer, and its classification as a luxury food, it seems rea-
sonable to assume that 'āyyāl meat was extensively imported at the time. The list of game meat that was served at King Solomon’s table according to 1 Kgs 5:3 (ET 1 Kgs 4:23) seems to support this position:

 besides 'āyyāls, and šebîs, and yahmûrs

Moreover, it could be that an interchange between šebî and 'āyyāl is reflected in the Song of Songs 4:5 and 7:4:

twins of a šebî

Deer commonly give birth to twins, while mountain gazelles and dorcas gazelles rarely do. However, it is possible that this refers to the Persian gazelle (Gazella subgutturossa), which gives birth to twins more often (the doe of the Persian gazelle is also hornless, and in this respect it resembles the doe of the deer). Persian gazelles were found until recent times in great numbers in eastern Jordan. It could be that the description of the Song of Songs reflects the local fauna of eastern Jordan. In the current state of research we lack any archaeozoological evidence indicating the presence of the Persian gazelle west of the River Jordan.

In Modern Hebrew it is usual to identify the 'āyyāl (אָיָל) with the roe deer (Capreolus capreolus), while the yahmûr is identified as the Mesopotamian fallow deer (Dama mesopotamica) (Bilik 1958: 20–25). If we accept the hypothesis that, based on morphological grounds (they all have branched antlers that are replaced every year), the 'āyyāl represents all of the local cervids common in the area, then it is difficult to assume that the yahmûr refers to the roe deer. If the yahmûr were the roe deer, it should have been listed directly after the 'āyyāl, while biblical texts mention the yahmûr directly after the šebî (Deut 14:5, 1 Kgs 5:3). This order may indicate that yahmûr actually refers to another clean ungulate that resembles the gazelle more than the deer.

The archaeozoological evidence strengthens this hypothesis, as it reveals that fallow deer remains were more common in the area than the relatively insignificant occurrences of roe deer (see Table 2: roe deer have been found only in 3 sites out of 66; also Table 3: only 2 sites out of 47). The rarity of roe deer in bone assemblages can be attributed to its biological characteristics (solitary and nocturnal).

Our conclusion is that 'āyyāl was the accepted name for all members of the cervid family that were common in the area, or as a specific name for all the large cervids: fallow deer (Dama mesopo-
and red deer (*Cervus elaphus*), which are similar in their body mass and shape of antlers. The former conclusion assumes that the old classification characterized the animals according to their weight. On this assumption the roe deer may represent the small deer (both in terms of total weight and size of antlers), and therefore it is mentioned as *yahmûr* directly after the *ṣebî*; that is of a similar size. The minor importance of *yahmûr* in the relevant period is inferred from the fact that it mentioned only twice (Deut 14:5, 1 Kgs 5:3). A similar pattern is also evident from later rabbinical texts. The *ʿayyāl* and *ṣebî* are mentioned numerous times, while the *yahmûr* is mentioned only once (*b Bek*:7). The assumption that Modern Hebrew replaced the names of *ʿayyāl* and *yahmûr* is also evident from the Arabic literature, where the *yahmûr* is presented as a small deer (Maalûf 1932: 49, 208–210; Al-Ani 1998: 102; see also Tristram 1884: 32–33). In the light of this information we find it difficult to identify the *ʿayyāl* with the roe deer, and it seems more likely that it refers to the fallow deer.

If we accept the hypothesis that the roe deer was also included in the general category of *ʿayyāl*, we suggest that *yahmûr* can be identified as the hartebeest (*Alcelaphus buselaphus*), as is also suggested in the translation of the Septuagint and Vulgate. These translations view the *yahmûr* as an antelope with curved horns like those of cattle (Kislev 2000: 222). Notably, the archaeozoological database reveals that hartebeest remains are the third most abundant clean ungulate species at LB-PP sites. Its remains were found in Late Bronze and Iron Age strata at Lachish (Croft 2005: 2294–2295), Late Bronze strata at Tel-es-Sharia (Davis 1982) and in Persian period strata at Tel-Halif (Seger et al. 1989: Table 8) (see Table 2). Hartebeest were also present in the region during the Middle Ages until modern times (Tristram 1884, 34). Other suggested identifications are ambiguous and doubtful. These identifications suggest that the *yahmûr* is the African gnu (*Connochaetes gnou*) (Schwartz 1900: 364–365) or the water buffalo (*Bubalus bubalis*) (Amar and Serri 2005: 63–70; Amar and Zivotofsky 2007: 379–387). However, none of these species was found in any archaeozoological bone assemblage.

### אַקּו ʾaqqô

The *ʾaqqô* is commonly recognized as the Nubian ibex (*Capra ibex nubiana*). However, the archaeozoological finds of this species are sporadic during the period discussed here; most probably because its distribution is limited to rocky desert habitats (Ps 104:18). A hint of its presence, however, might be found in Job 39:1:

Do you know when the wild goats give birth?
It is possible also that ʾaqqô refers to a wild goat species (*Capra aegagrus*) (Felix 1984: 18), although it is identical to the ibex according to the old classification criteria. Furthermore, these species have a close genetic relationship, and can easily be bred in captivity to produce fertile offspring. The only relevant site which includes the remains of the wild goat is the Iron Age strata of Tel Kinrot (Ziegler and Boessneck 1990: 133–158), but given the difficulty of distinguishing this species from the domestic goat, this find remains highly questionable. The skeletal similarities are reflected in all parts, and the only skeletal criterion which is easily recognized is the horns, which are rare at most archaeological sites. Nevertheless, the wild goat was familiar in the past landscape of the country, its remains being known from prehistoric to modern times. The wild goat was found in the mountainous region of Syria and Lebanon at the beginning of the twentieth century (Aharoni 1943–1946: 120–122, 240), and it is possible that it still exists there today.

דִישֹׁן dišōn

The *dišōn* is mentioned only once in the HB. The Aramaic translations recognize that it is synonymous with the *rēēm* (Num 23:22; Job 39:9), another clean ungulate that is mentioned in the HB and is recognized by its impressive horns that can cause severe injury (Deut 33:17; Ps 92:11). Other researchers identify the *rēēm* with the aurochs (*Bos primigenius*), as it is the only species that is mentioned, and is similar to cattle (Deut 33:17; Isa 34:7; Ps 29:6) (Aharoni 1943–1946: 253; Levinger and Dor 1975: 47; Felix 1992: 98–101). So far, remains of aurochs have been found only at Tel Hesban (Von den Driesch and Boessneck 1995: 67–108). Here also it is difficult to distinguish between the bones of wild aurochs and its domestic descendant. It is possible that after its extinction from the region its name was changed to oryx (Levinger and Dor 1975: 47).

The term *pygargos*, which means “white-chest,” is mentioned in the Septuagint and Vulgate translations, and based on these criteria some recognize it as the *Addax nasomaculatus* (Tristram 1884: 34–35; Wood 1869: 141–142; Aharoni 1935: 107). However, no archaeological remains of this species have been found in any of the historical periods of the region. On the other hand, it seems that the term “white-chest” also fits the *Oryx leucoryx*, which features its characteristics long straight horns. This species was common in the southern parts of Israel (Negev and Arava) and became extinct only at the beginning of the twentieth century. A single oryx horn was found at the Persian site of Tel Nov in the Golan Heights (Horwitz 2000: 121–134) as well as in the Byzantine deposits of Tel Hesban (Von den Driesch and Boessneck 1995: 90–91). The hypothesis that tēʾô should be recognized as the aurochs (*Bos primigenius*) reinforces the suggestion that the oryx was identical to the *dišōn* or *rēēm* in ancient Israel.
The identification of the dišōn with the ibex in the RSV does not seem reasonable (and it has been suggested that it refers to the 'aqqād). Its identification with the water buffalo (Bubalus bubalis) (Paper 1972: 153) is also problematic, as we now know that the water buffalo arrived in the Middle East only in the Middle Ages (Amar and Serri 2005). On the same grounds we find it reasonable to dismiss its identification with the rhinoceros (Rhinocerotidae), as it has never existed anywhere in the southern Levant throughout history. It seems again that the archaeozoological finds provide a straightforward method for eliminating animals that were never part of the local fauna during the relevant period.

תְאוֹ těʾô

Most of the traditional identifications categorize the těʾô with the aurochs (Bos primigenius) (Isa 51:20), which lived in the southern Levant until the Iron Age (Von den Driesch and Boessneck 1995: 68). The aurochs is mentioned once in the Mishna in a debate as to whether or not it belongs in the category of domestic livestock (cattle) or wild game:

רבי יוסי אומר, מין חיה.

A wild ox is a kind of domesticated animal. And R. Yose says, “a kind of wild animal.” (m Kil 8:6; trans. Mandelbaum 1982)

In the Septuagint, Vulgate, and later translations it has many names, such as oryx, urus and uri. It is possible that after it became extinct in the southern Levant its name was changed to Oryx leucoryx, which as previously mentioned was recognized as rēēm.

Starting in the early Middle Ages, some identified the těʾô as the domestic Asian water buffalo (Bubalus bubalis) (HaParchi A. 1899: 768; see also Serri 2004: 90–91). This identification is accepted by later scholars (Schwartz 1900: 366). This may explain why in Modern Hebrew its name is frequently associated with the water buffalo. As we have already mentioned, historical sources indicate that the water buffalo first arrived in the Middle East only in the 8th century, the Early Islamic period (Amar and Serri 2005: 63–70; Amar and Zivotofsky 2007: 379–387). However, to this day we still lack archaeozoological evidence of its remains.

The identification of the těʾô with the water buffalo affected the translations of some later European scholars. In Europe it was identified as the wisent or the European bison (Bison bonasus) (White 1974: 204), which was widely distributed in Europe until the early 18th century, but today is threatened with extinction. The archaeozoological finds from Israel indicate that this species never existed anywhere in the southern Levant. Also in the Middle Ages it was suggested that the těʾô was the hartebeest (Alcelaphus buselaphus), but we prefer to classify it as the yahmūr. This identification results from the Arabic name of the hartebeest بقر وحلل which
means “wild cattle” (Ibn Janah; trans. Neubauer 1875). This phonetic similarity between its name and the Latin name of water buffalo (*Bubalus bubalis*) does not seem to be coincidental.

This species, which closes the list of the clean ungulates because of its rarity, has been variously classified over the ages. Some recognize it literally as the wild sheep (*Ovis orientalis*) (Felix 1984: 33). Although its presence has been reported at two archaeological sites, Tel Kinrot and Tel Hesban (Ziegler and Boessneck 1990: 141; Von den Driesch and Boessneck 1995: 86–87), we must be aware that the identification of archaeozoological finds is not definitive because of its great similarity to domestic sheep. However, we know that wild sheep were present in historical periods in modern Jordan. We should also be cautious in the identification of the wild goat in archaeozoological contexts that are dominated by the domestic goat. It is possible that one find in Tel Kinrot was a wild goat (Ziegler and Boessneck 1990: 141). It seems reasonable to reject the translation of the RSV, which identifies it as the chamois (*Rupicapra rupicapra*), a species that never lived in the southern Levant.

Aharoni first suggested that the *zemer* was the *Oryx leucoryx* (Aharoni 1943–1946: 104–112; Bodenheimer 1953: 250), but there is no evidence for this identification. Later, he suggested identifying it with the Barbary sheep (*Ammotragus lervia*), and mentioned that it was still found at the beginning of the twentieth century in the southeastern area of the Dead Sea (Aharoni 1943–1946: 22–23; Bodenheimer 1953: 251; Bilik 1961: 31). But there is no further evidence of its existence, and no finds have been reported from any of the archaeological sites in Israel (see also Shalmon 1996: 4).

Another suggestion put forward in recent years identifies the *zemer* as the giraffe, an African ungulate that has all the criteria of a clean animal (Amar et al. 2003: 491–499). The difficulty with this identification is mainly that giraffe have never been found in the archaeological sites of historical Israel, and we have no archaeozoological support for its presence. The giraffe was most probably part of the local fauna in Upper Egypt, but disappeared during the Early Dynastic period (mid-third millennium BCE). Later, during the 18th Dynasty (Late Bronze Age), the giraffe arrived again in Egypt from Libya and Sudan. Numerous animal bones, rock art and tomb inscriptions in ancient Egypt indicate its importance in the local fauna. It is also suggested that it might have been domesticated or tamed at certain periods in Egypt (Spinage 1968: 36; Huyage 1998: 9–10; Osborn and Osbonova 1998: 149–150). It is possible that giraffe were known in ancient Israel as an exotic and rare species kept in official zoos (1 Kgs 10:22). There is evidence for this from the Byzantine period in Israel (Amar et al. 2003: 492–493). We have no doubt that the *zemer* was a rare species in the southern Levant.
This is indicated also by the fact that it closes the list of clean animal.

Thus it seems that zemer refers either to wild sheep or wild goat, two species that were present in ancient Israel. Furthermore, it reinforces the idea that the order of the clean ungulates is significant. This would explain why in the text list the domesticated clean ungulates are first and their predecessor wild ungulates (tēʾō and zemer) are last. Nevertheless, the archaeozoological research does not provide a clear distinction between the different identifications (wild goat or wild sheep).

**SUMMARY**

The identification of the seven clean, wild ungulates is a complex issue that has been studied and discussed by past translators and modern scholars. In this paper we provide a new contribution to this debate by highlighting the appearance of clean ungulates in archaeozoological contexts of southern Levantine assemblages. Although the identification of the clean ungulates relies primarily on the examination of old identification traditions, we show that the archaeozoological research provides new sources of information for identifying and classifying the different options on concrete and empirical grounds.

We conclude by suggesting two possible identifications for each of the seven clean wild ungulates (Table 4). The first option, which seems more reasonable, fits the hypothesis that each of the animals is a member of a separate taxonomic group (Kislev 2000, 224). While it is difficult to identify each species absolutely, we were able to reduce the possible identifications considerably, and retain only the most reasonable ones. For this reason we feel safe in rejecting several identifications, such as identifying the dišōn as the addax (*Addax nasomaculatus*), and the tēʾō as the domestic Asian water buffalo (*Bubalus bubalis*), wisent (European bison, *Bison bonasus*), or rhinoceros (*Rhinocerotidae*).

Though later texts in the HB mention the names of three additional clean ungulates, it appears that these are synonymous with some of the clean ungulates of Deuteronomy: rēēm (=dišōn=tēʾō), yaʾel (=ʾaqqō) and mēri (fattened cattle) (Maimonides, Mishneh Torah, Forbidden Foods [1:8]). Furthermore, the archaeozoological record does not provide evidence for additional clean ungulates that existed in the southern Levant in the LB-PP. The only ones that appear are listed in Table 4. Similarly, the many rock drawings of Timna, Sinai, and Wadi Rumm, which most probably represent the local fauna, indicate that the species that existed there are those that are represented in the archaeozoological record. It also shows that the species most depicted are those that were most abundant in the region: the Nubian ibex (*Capra ibex nubiana*), aurochs (*Bos primigenius*), Arabian oryx (*Oryx leucoryx*), hartebeest (*Alcelaphus buselaphus*), and gazelle (*Gazella sp.*). The fallow deer, however, is completely absent (Shalmon 1996: 52). Doubtless these mammals
represent the local landscape of the desert habitats in the southern Levant. On the other hand, the list of the clean animals in the HB seems to reflect the populations whose living habitats were more concentrated in the territory from Dan to Beer Sheba: the central highlands, the coastal plain, and the Jordan Valley. This would explain why the deer and the gazelle are listed first, as they represent the most abundant clean ungulates in these regions.

In addition, each of our suggested identifications for the clean ungulate species is derived from a different habitat (see Table 5): the ʾayyāl lives in the Mediterranean forest and along riverbeds; the ʾeḇi is abundant in open country; the ʾaḥmāʾr (Alcelaphus buselaphus) and the ṭeʾ o (Bos primigenius) are most abundant near permanent water sources in the Sharon and the Jordan Valley; the ʾaqqō (Capra ibex nubiana), and probably also the zemer, is found on cliffs and in rocky habitats; and the dišōn (Oryx leucoryx) roams desert savannah habitats.

Further support that the list of clean ungulates reflects their abundance is furnished by the archaeozoological record. Deuteronomy 14 opens with listing the domesticated livestock (cattle, sheep, and goat), and continues with a list of the other wild ungulates according to their importance or abundance in the diet. Archaeozoological and textual records agree that deer and gazelle were the most abundant game animals in ancient Israel. The data suggest that the term “deer” was a common name for all the local deer species (Cervidae), or a name for only the large deer species (Dama mesopotamica and Cervus elaphus). It is unlikely that ʾayyāl refers only to roe deer (Capreolus capreolus), as it is almost entirely absent from the archaeozoological record. It is also possible that “deer” refers only to the Mesopotamian fallow deer (Dama mesopotamica). If the old taxonomy named the animals according to their size, it is possible that the roe deer, the smallest deer with its short antlers, is the ʾaḥmāʾr, following the ʾeḇi, which is similar in the size of its horns and body mass. We, however, prefer to assume that ʾaḥmāʾr refers to the hartebeest (Alcelaphus buselaphus).

The appearance of the zemer at the end of the list indicates that it refers to a rare species that was only seldom exploited. For this reason its identification is the most doubtful and ambiguous. If we accept the hypothesis that all the clean ungulates lived in ancient Israel there is good reason to identify it with the wild sheep or wild goat. Thus the list of the clean animals starts with the domesticated livestock and ends with their wild predecessors.

**ACKNOWLEDGMENTS**

We thank Ella Tsahar for her input to the archaeozoological database and John Tresman for his assistance with editing the text. An earlier version of the paper was published in Hebrew in *Cathedra.*
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CONTRIBUTION OF ARCHAEOZOLOGY


CONTRIBUTION OF ARCHAEOZOOLOGY

Wiesbaden: Otto Harrassowitz.

**TABLE 1: IDENTIFICATION OF THE SEVEN CLEAN, WILD UNGULATE SPECIES**

<table>
<thead>
<tr>
<th>Species name in the HB</th>
<th>English translations</th>
<th>Translations of Septuagint and Vulgate</th>
<th>Aramaic translations</th>
<th>Arabic translations</th>
<th>Possible Identification from the ancient translations</th>
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</thead>
<tbody>
<tr>
<td>ʾayyāl</td>
<td>Hart</td>
<td>Elaphos Cervus</td>
<td>Ayla</td>
<td>إيل</td>
<td>Family Cervidae Capreolus capreolus Cervus elaphus Dama mesopotamica Gazella sp.</td>
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<tr>
<td>ʾebīy</td>
<td>Roebuck Gazelle</td>
<td>Dorcas Capreus</td>
<td>Tabī</td>
<td>طبي</td>
<td>Gazella sp. Family Cervidae Cervus elaphus Capreolus capreolus</td>
</tr>
<tr>
<td>yahmûr</td>
<td>Fallow deer Roebuck</td>
<td>Bubalus Capreolus</td>
<td>Yahmûra</td>
<td>يحمور</td>
<td>Dama mesopotamica Capreolus capreolus Buselaphus alcelaphus Bubalus bubalis Connochaetes gnou Wild goat?</td>
</tr>
<tr>
<td>ʾaqqō</td>
<td>Wild goat</td>
<td>Tragelaphos Tragelaphus</td>
<td>Ya’ala</td>
<td>وعل</td>
<td>Capra ibex (nubiana) Capra aegagrus</td>
</tr>
<tr>
<td>Hebrew</td>
<td>English</td>
<td>Hebrew</td>
<td>English</td>
<td>Arabic</td>
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</tr>
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<td>--------</td>
<td>---------</td>
<td>--------</td>
<td>---------</td>
<td>--------</td>
<td>---------</td>
</tr>
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<td>dišōn</td>
<td>Pygarg</td>
<td>Pygargos</td>
<td>Ryma</td>
<td>إربو</td>
<td>Addax nasomaculatus</td>
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<td></td>
<td>Ibex</td>
<td>Pygargus</td>
<td></td>
<td></td>
<td>Bos primigenius</td>
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<td>Bubalus bubalis</td>
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<tr>
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<td></td>
<td></td>
<td>Oryx leucoryx</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Capra ibex</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rhinocerotidae</td>
</tr>
<tr>
<td>ṭē’ō</td>
<td>Wild ox</td>
<td>Oryx</td>
<td>Turbēla</td>
<td>لبتيل</td>
<td>Bos primigenius</td>
</tr>
<tr>
<td></td>
<td>Antelope</td>
<td></td>
<td></td>
<td></td>
<td>Buselaphus alcelaphus</td>
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<td></td>
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<td>Bison bison</td>
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<td>zemer</td>
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<td>زراقة</td>
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<td>Iron Age</td>
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<td>14</td>
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### Table 3: Distribution of Wild Ungulates in Different Environmental Settings in the Southern Levant during the Iron Age

<table>
<thead>
<tr>
<th>Animal in the archaeozoology report</th>
<th>Upper &amp; Lower Galilee, Golan Heights</th>
<th>Sea of Galilee &amp; Jordan Valley</th>
<th>Jordan &amp; Carmel Coast</th>
<th>Shephelah &amp; the Sharon</th>
<th>Judean foothills</th>
<th>Negev &amp; Arava</th>
<th>Total</th>
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<tbody>
<tr>
<td>Dama mesopotamica</td>
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<td>4</td>
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<td>Bos primigenius</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Alcelaphus buselaphus</td>
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<td>0</td>
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<td>0</td>
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<tr>
<td>Wild goat</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wild sheep</td>
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</table>

Total: 117
### Table 4: The Seven Clean Wild Ungulate Species and Their Identification According to the Archaeozoological Evidence

<table>
<thead>
<tr>
<th>Species name in the HB</th>
<th>First identification</th>
<th>Second identification</th>
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</thead>
<tbody>
<tr>
<td>אַיָּל 'ayyāl</td>
<td>Cervidae</td>
<td>Dama mesopotamica</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cervus elaphus</td>
</tr>
<tr>
<td>גֶּזֶל גּוּזְבָּר sēbī</td>
<td>Gazella sp.</td>
<td>Gazella sp.</td>
</tr>
<tr>
<td>יַחְמוּר yahmūr</td>
<td>Buselaphus alcelaphus</td>
<td>Capreolus capreolus</td>
</tr>
<tr>
<td>כַּפְרָה 'aqqō</td>
<td>Capra ibex (nubiana)</td>
<td>Capra ibex (nubiana)</td>
</tr>
<tr>
<td>יָרֹץ dišōn</td>
<td>Oryx leucoryx</td>
<td>Bos primigenius</td>
</tr>
<tr>
<td>בָּשָׁלֹשׁ tēʾō</td>
<td>Bos primigenius</td>
<td>Buselaphus alcelaphus</td>
</tr>
<tr>
<td>זֶמֶר zemer</td>
<td>Wild goat or Wild sheep</td>
<td>Giraffe or Wild goat or Wild sheep</td>
</tr>
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</table>

### Table 5: Summary of Clean Ungulate Species Suggested in This Study

<table>
<thead>
<tr>
<th>Species name in the HB</th>
<th>Common Name</th>
<th>Species Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>אַיָּל 'ayyāl</td>
<td>Fallow deer</td>
<td>Dama mesopotamica</td>
</tr>
<tr>
<td></td>
<td>Red deer</td>
<td>Cervus elaphus</td>
</tr>
<tr>
<td></td>
<td>Roe deer</td>
<td>Capreolus capreolus</td>
</tr>
<tr>
<td>גֶּזֶל גּוּזְבָּר sēbī</td>
<td>Mountain gazelle</td>
<td>Gazella sp.</td>
</tr>
<tr>
<td>יַחְמוּר yahmūr</td>
<td>Hartebeest</td>
<td>Alcelaphus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>buselaphus</td>
</tr>
<tr>
<td>כַּפְרָה 'aqqō</td>
<td>Nubian ibex</td>
<td>Capra ibex (nubiana)</td>
</tr>
<tr>
<td>יָרֹץ dišōn</td>
<td>Arabian oryx</td>
<td>Oryx leucoryx</td>
</tr>
<tr>
<td>בָּשָׁלֹשׁ tēʾō</td>
<td>Aurochs</td>
<td>Bos primigenius</td>
</tr>
<tr>
<td>זֶמֶר zemer</td>
<td>Mouflon</td>
<td>Ovis aries</td>
</tr>
<tr>
<td></td>
<td>Wild goat</td>
<td>Capra aegagrus</td>
</tr>
</tbody>
</table>
Images

אַיָּל 'ayyāl - Fallow Deer

צְבִי ṣěbî - Mountain gazelle
CONTRIBUTION OF ARCHAEOZOOLOGY

צְבִי ṣěbî Dorcas gazelle

יַחְמוּר yaḥmûr Hartebeest

אַקּו ʾ aqqô Nubian ibex

דִישֹׁן dišôn Arabian oryx
Aurochs

Mouflon

Wild Goat