

The Journal of Hebrew Scriptures

ISSN 1203-1542

<http://www.jhsonline.org> and

<http://purl.org/jhs>



Articles in JHS are being indexed in the ATLA Religion Database, [RAMBI](#), and [BiBIL](#). Their abstracts appear in Religious and Theological Abstracts. The journal is archived by *Library and Archives Canada* and is accessible for consultation and research at the Electronic Collection site maintained by [Library and Archives Canada](#) (for a direct link, click [here](#)).

VOLUME 10, ARTICLE 1

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

**THE CONTRIBUTION OF
ARCHAEOZOOLOGY TO THE
IDENTIFICATION OF THE RITUALLY
CLEAN UNGULATES MENTIONED IN
THE HEBREW BIBLE**

ZOHAR AMAR¹, RAM BOUCHNICK² AND GUY BAR-
OZ^{2*}

¹*The Martin (Szusz) Department of Land of Israel Studies and Archaeology, Bar-Ilan University, Ramat-Gan, 52900 Israel.*

²*Laboratory of Archaeozoology, Zinman Institute of Archaeology, University of Haifa, Mount Carmel, Haifa, 31905 Israel.*

**Corresponding author: Guy Bar-Oz, Laboratory of Archaeozoology, Zinman Institute of Archaeology, University of Haifa, Haifa 31905, Israel. Telephone # 972-4-8240070, Fax: # 972-4-8249876, Email: guybar@research.haifa.ac.il.*

INTRODUCTION

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

זאת הבהמה אשר תאכלו עֹר שֶׁה כְּשִׁבִים וְשֶׁה עֲזִים:
אֵיל וְצִבִי וְיַחְמֹר וְאֶקוּ וְדִישָׁן וְתֵאוּ וְזֶמֶר:

These are the beasts which ye may eat: the ox, the sheep, and the goat; the 'ayyāl, the šēbī, and the yahmūr; and the 'aqqō, the dišōn, the tē'ō, 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 domesticated 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 includes analysis of the literary contexts of the biblical texts, comparison with contemporary cultures in the Near East, traditional translations 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 identification of the seven clean, wild ungulates. We will first present evidence for the abundance of clean, wild ungulates from archaeological 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 ungulate bones, but such an extensive corpus of data has not been used to advance the identification of these seven clean, wild ungulates. In particular, we maintain that the significant amount of recent archaeozoological data from the Late Bronze to the Persian period sites (hereafter, LB-PP sites) in the southern Levant provides us with a qualitative indicator to examine the relative abundance of wild ungulates. This indicator, in turn, enables us to propose 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 territories 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 marginal 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

2000: 76–85; Rosen 2007). 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:

כָּל־מִפְרָסֶת פְּרָסָה וְשִׁטְעַת שֵׁסַע פְּרִסְתֵּי מַעֲלַת גֵּרָה בְּבֵהֶמָּה
אֵתָהּ תֹאכְלוּ:

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

אֵיִל וְצִבִּי *’ayyāl and ṣēbî*

There is no doubt that the *ṣēbî* can be identified with the gazelle species: mountain gazelle and dorcas gazelle. The *’ayyāl* 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 *’ayyāl* is mentioned 21 times, while *ṣēbî* 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 ^ʾ*ayyāl* 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:

לְבַד מֵאֵיל וּצְבִי וְיַחְמוֹר

besides ^ʾ*ayyāls*, and *šēbîs*, and *yahmûrs*

Moreover, it could be that an interchange between *šēbî* and ^ʾ*ayyāl* is reflected in the Song of Songs 4:5 and 7:4:

תְּאוֹמֵי צְבִיָּה

twins of a *šēbî*

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 subgutturosa*), 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.

יַחְמוֹר *yahmûr*

In Modern Hebrew it is usual to identify the ^ʾ*ayyāl* (אֵיל) 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 ^ʾ*ayyāl* 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 ^ʾ*ayyāl*, while biblical texts mention the *yahmûr* directly after the *šēbî* (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 ^ʾ*ayyāl* 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-*

tamica) 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 *šēbî*; 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 *’ayyāl* and *šēbî* are mentioned numerous times, while the *yahmûr* is mentioned only once (b Bek:7b). The assumption that Modern Hebrew replaced the names of *’ayyāl* and *yahmûr* is also evident from the Arabic literature, where the *yahmûr* is presented as a small deer (Maalūf 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 *’ayyāl* 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 *’ayyāl*, 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.

יִקָּוּ *’aqqô*

The *’aqqô* 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 :

הֲיָדַעְתָּ עַתָּה לְדַת יְעִלֵי־סֹלֶעַ

Do you know when the wild goats give birth?

It is possible also that *ʿaqqô* 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.

דִּישׁוֹן *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 characteristic 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 *tēʿô* 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 ^ʾ*aqqō*). 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.

שׁוֹר תֵֹּׁׁ ם

Most of the traditional identifications categorize the *tēʾō* 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:

שׁוֹר בַּר, מִיֵּן בַּהֲמָה; רַבִּי יוֹסֵי אֹמֵר, מִיֵּן חַיָּה.

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 *tēʾō* 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 *tēʾō* 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 *tēʾō* was the hartebeest (*Alcelaphus buselaphus*), but we prefer to classify it as the *yaḥmûr*. This identification results from the Arabic name of the hartebeest بقر وحش which

means “wild cattle” (Ibn Janah; trans. Neubauer 1875). This phonetic similarity between its name and the Latin name of water buffalo (*Bubalus bubalus*) does not seem to be coincidental.

זֶמֶר *zemer*

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 (*tē'ō* 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 *tē'ō* 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* = *tē'ō*), *ya'el* (= *'aqqō*) 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 *'ayyāl* lives in the Mediterranean forest and along riverbeds; the *ṣēbī* is abundant in open country; the *yahmūr* (*Alcelaphus buselaphus*) and the *tē'ō* (*Bos primigenius*) are most abundant near permanent water sources in the Sharon and the Jordan Valley; the *'aqqō* (*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 *'ayyāl* 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 *yahmūr*, following the *ṣēbī*, which is similar in the size of its horns and body mass. We, however, prefer to assume that *yahmūr* 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*.

BIBLIOGRAPHY

- Aharoni, I. 1935. "Maimonides the Zoologist." *Haaretz*: 107 (Hebrew).
- Aharoni, I. 1943–1946. *Memories of a Hebrew Zoologist*. Jerusalem: Ariel Publishers (Hebrew).
- Al-Ani, F. 1998. *Encyclopedia of Arabian Animals*. Irbid: Matb'at albhrbat: 102.
- Amar, Z., and Y. Serri. 2005. "When Did the Water Buffalo Make Its Appearance in Israel?" *Cathedra* 117: 63–70 (Hebrew).
- Amar, Z., and A. Z. Zivotofsky. 2007. "The Kashrut Law of the Buffalo." *Tehumin* 27: 379–387 (Hebrew).
- Amar, Z., A. Z. Zivotofsky, and D. Zivotofsky. 2003. "The Kashrut of the Giraffe – a Post-mortem Report." *Tehumin* 23: 491–499 (Hebrew).
- Baruch, U., and S. Bottema. 2000. "A New Pollen Diagram from Lake Hula." *Quaternary International* 73/74: 127–136.
- Bilik, E. 1958. "The Fallow Deer." *Beth Mikra* 3: 20–25 (Hebrew).
- Bilik, E. 1961. "Clean Ungulates in the Bible." *Beth Mikra* 6: 28–31 (Hebrew).
- Bilik, E. 1979. "The Deer and the Gazelle." Pp. 324–329 in: Ben-Zion Luria Book. Jerusalem: Kiryat sefer (Hebrew).
- Bodenheimer, F.S. 1950. *Animals of the Bible Lands*. Jerusalem: Mosad Bialik (Hebrew).
- Bodenheimer, F.S. 1953. *The Animals of Israel*. Tel-Aviv, Devir (esp. pp. 250–251). (Hebrew).
- Borowski, O. 1998. *Every Living Thing: Daily Use of Animals in Ancient Israel*. Walnut Creek, CA/London: AltaMira Press.
- Cansdale, G. 1970. *Animals of Bible Lands*. London: The Paternoster Press.
- Croft, P.W. 2005. "Archaeozoological Studies." Pp. 2254–2347 in D. Ussishkin (ed.), *The Renewed Archaeological Excavations at Lachish 1973–1994*. Tel-Aviv: Tel-Aviv University, Institute of Archaeology.
- Davis, S.J.M. 1982. "Climatic Change and the Advent of Domestication: The Succession of Ruminant Artiodactyls in the Late Pleistocene-Holocene in the Israel Region." *Paléorient* 8: 5–15.
- Dayan, T. 1999. "Faunal Remains Pp. 480–494 in I. Beit-Arieh. (ed.), *Tel 'Ira: A Stronghold in the Biblical Negev*. Emery and Claire Yass Publications in Archaeology of the Institute of Archaeology, Tel Aviv University.
- Dor, M. 1992. "The Ruminants in the Biblical and Mishna Periods." *Beth Mikra* 37: 122–130 (Hebrew).
- Dor, M. 1997. *Animals in the Biblical, Mishna and Talmudic Periods*. Tel Aviv: Grafor-Defitel (Hebrew).

- Douglas, M. 1966. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. London : Routledge & K. Paul.
- Felix, Y. 1984. *Animals and Plants of the Torah*. Jerusalem: Israel Hatzair (Hebrew).
- Felix, Y. 1992. *Nature and Land in the Bible*. Jerusalem: R. Mas (Hebrew).
- Gerstenberger, Erhard. 1996. *Leviticus: A Commentary*. Old Testament Library Douglas W. Stott (trans.). Louisville: Westminster John Knox Press.
- Haparchi, A. 1332. *Bulb and Flower*. Jerusalem: M. Lunz, 1897 (Hebrew).
- Hellwing, S. "Human Exploitation of Animal Resources in the Early Iron Age Strata at Tel Beer-Sheba." Pp. 105–115 in Z. Herzog (ed.), *Beer-Sheba II: The Early Iron Age Settlements*. Tel Aviv: The Tel Aviv Institute of Archaeology and Ramot Publishing.
- Houston, W. 1993. *Purity and Monotheism: Clean and Unclean Animals in Biblical Law*. Sheffield: Sheffield Academic.
- Horwitz, L.K. 2000. "Animal Remains from Tel Nov, Golan Heights." *Atiqot* 39: 121–134.
- Huyge, D. 1998. "Giraffes in Ancient Egypt." *Nekhen News* 10: 9–10.
- Kislev, M. 2000. "Taxonomic Identification of the Ten Kosher Ruminants." *Sinai* 125: 216–225 (Hebrew).
- Levine, L.I., and A. Mazar (eds.). 2001. *The Controversy over the Historicity of the Bible*. Jerusalem: Yad Izhak Ben-Zvi and Dinur Center, Hebrew University.
- Levinger, Y. M., and M. Dor. 1975. "The Seven Clean Ungulates." *Torah Ve'Mada* 4: 37–49 (Hebrew).
- Lev-Yadun, S. 1997. "Flora and Climate in Southern Samaria: Past and Present." Pp. 85–102 in I. Finkelstein, Z. Lederman and S. Bunimovitz (eds.), *The Highlands of Many Cultures I*. Tel Aviv: The Institute of Archeology, Tel Aviv University.
- Lewysohn, L. 1858. *Die Zoologie des Talmuds*. Frankfurt: Joseph Baer.
- Lipshitz, N. 1986. "The Vegetational Landscape and the Macroclimate of Israel during Prehistoric and Protohistoric Periods." *Journal of the Israel Prehistoric Society* 19: 80–90.
- Maalūf, A. 1932. *Al Mu'jam al-Hayawān*. Cairo: Dar alraed al-'Arabi.
- Maimon, M.B. *The Code of Maimonides*. L.I. Rabinovitz and P. Grossman (trans.). Yale Judaica Series. New Haven: Yale University Press.
- Mandelbaum, I. 1982. *A History of the Mishnaic Law of Agriculture: Kilayim, Translation and Exegesis*. Chico, CA: Scholars Press.
- Milgrom, J. 1991. *Leviticus 1–16: A New Translation with Introduction and Commentary*. Anchor Bible 3. New York: Doubleday.

- Neubauer, A. 1875. *The Book of the Roots by Ibn Janah*. Oxford: Clarendon.
- Osborn, D. J., and J. Osbornova. 1998. *The Mammals of Ancient Egypt*. Warminster: Aris & Phillips.
- Paper, H.H. 1972. *A Judeo-Persian Pentateuch*. Jerusalem: Ben-Zvi Institute, Hebrew University.
- Rosen, A.M. 2007. *Civilizing Climate: Social Responses to Climate Change in the Ancient Near-East*. Lanham, MD: Altamira Press.
- Schwartz, Y. 1900. *Crops of the Land of Israel*. Jerusalem: Ariel (Hebrew).
- Seger, J.D., et al. 1989. "The Bronze Age Settlements at Tell Halif: Phase II Excavations, 1983–1987." *Bulletin of the American Schools of Oriental Research* 26: 1–32.
- Serri, Y. 2004. "Translation Tradition of Rabbi Yosef Kapach to Animal Names in the Bible." Pp. 90–91 in Z. Amar and Y. Serri. *The Memorial Book for Rabbi Kapach*. Z. Ramat-Gan: Oren Press (Hebrew).
- Shalmon, B. 1996. "Live Rocks." *Eretz Ve'Teva* 42: 45–54 (Hebrew).
- Spinage, C.A. 1968. *The Book of the Giraffe*. London: Collins.
- Tchernov, E., T. Dayan and Y. Yom-Tov. 1986/87. "The Paleogeography of *Gazella Gazella* and *Gazella Dorcas* during the Holocene of the Southern Levant." *Journal of Zoology* 34: 51–59.
- Tchernov, E., and A. Drori. 1983. "Economic Patterns and Environmental Conditions at Khirbet el Msas during the Early Iron Age." Pp. 213–222 in V. Fritz and A. Kempinski, *Die Ergebnisse der Ausgrabungen auf der Hirbat el Msas (Tel Masos), 1972–1975*. Wiesbaden: Otto Harrassowitz.
- Tristram, H.B. 1884. *The Fauna and Flora of Palestine*. London: Palestine Exploration Fund.
- Tsahar, E., et al. 2008. "Anthropogenic Holocene Southern Levantine Ungulate Extinctions." *PLoS ONE* 4(4): <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0005316>
- Von den Driesch, A., and J. Boessneck. 1995. Final Report on the Zooarchaeological Investigation of Animal Bone Finds from Tell Hesban, Jordan." Pp. 67–108 in Ø.S. LaBianca and A. Von der Driesch (eds.), *Hesban 13: Faunal Remains*. Berrien Springs, MI: Andrews University Press.
- White, L. 1974. "Indic Elements in the Iconography of Petrarch's Trionfo Della Morte." *Speculum* 49: 204.
- Wood, J. G. 1869. *Bible Animals*. London: Guelph. Ontario: J.W. Lyon and Company, Publishers.
- Ziegler, R., and J. Boessneck. 1989. "Tierreste der Eisenzeit II." Pp. 133–158 in V. Fritz (ed.), *Kinneret Ergebnisse der*

Ausgrabungen auf dem Tell el-'Oreme am See Gennesaret, 1982–1985.
Wiesbaden: Otto Harrassowitz.

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

Species name in the HB	English translations	Translations of Septuagint and Vulgate	Aramaic translations	Arabic translations	Possible Identification from the ancient translations
אֵיִל 'ayyāl	Hart	Elaphos Cervus	Ayla	ايل	Family Cervidae Capreolus capreolus Cervus elaphus Dama mesopotamica Gazella sp.
שֶׁבִי שְׁבִי šəbī	Roebuck Gazelle	Dorcas Capreus	Tabi	ظبي	Gazella sp. Family Cervidae Cervus elaphus Capreolus capreolus
יָהֳמוֹר yāḥmûr	Fallow deer Roebuck	Bubalus Bubalus	Yāḥmûra	يحمور	Dama mesopotamica Capreolus capreolus Buselaphus alcelaphus Bubalus bubalis Connochaetes gnou Wild goat?
אֶקֶוֹ 'aqqô	Wild goat	Tragelaphos Tragelaphus	Ya'ala	وعل	Capra ibex (nubiana) Capra aegagrus

דישון dišōn	Pygarg Ibex	Pygargos Pygargus	Ryma	اروي	Addax nasomaculatus Bos primigenius Bubalus bubalis Oryx leucoryx Capra ibex Rhinocerotidae
תאֵו תאֵו tē'ō	Wild ox Antelope	Oryx Oryx	Turbēla	ثيئل	Bos primigenius Buselaphus alcelaphus Bubalus bubalis Bison bonasus Oryx leucoryx
זמר zemer	Chamois Mountain-sheep	Camelopardalis Camelopardalus	Dyta	زرافة	Capra aegagrus Giraffa camelopardalis Oryx leucoryx Ovis musimon Ammotragus lervia

**TABLE 2: DISTRIBUTION OF WILD UNGULATES IN
ARCHAEOLOGICAL SITES IN THE SOUTHERN LEVANT
FROM LATE BRONZE TO PERSIAN PERIOD**

Species name	Common name	Late Bronze	Iron Age	Persian	Total
Number of sites per period		24	90	19	133
<i>Dama mesopotamica</i>	Fallow deer	10	48	8	66
<i>Gazella gazella</i>	Mountain gazelle	12	39	3	54
<i>Cervus elaphus</i>	Red deer	2	5	0	7
Gazella sp. <i>Gazella gazella</i> / <i>Gazella dorcas</i>	Gazelle	2	14	2	18
<i>Cervidae</i> <i>Dama mesopotamica</i> / <i>Cervus elaphus</i>	Red or fallow deer	2	7	1	10
<i>Capreolus capreolus</i>	Roe deer	0	2	1	3
<i>Bos primigenius</i>	Aurochs	0	1	0	1
<i>Capra ibex (nubiana)</i>	Nubian Ibex	0	1	1	2
<i>Oryx leucoryx</i>	Arabian oryx	0	0	1	1
<i>Alcelaphus buselaphus</i>	Hartebeest	2	1	1	4
<i>Capra aegagrus</i>	Wild goat	0	1	0	1
<i>Ovis aries</i>	Wild sheep	0	2	0	2
<i>Bubalus bubalis</i>	Water buffalo	0	0	0	0
<i>Connochaetes gnou</i>	Gnu	0	0	0	0
<i>Addax nasomaculatus</i>	Addax	0	0	0	0
<i>Bison bonasus</i>	European bison	0	0	0	0
<i>Giraffa camelopardalis</i>	Giraffe	0	0	0	0
<i>Rhinocerotidae</i>	Rhinoceros	0	0	0	0

TABLE 4: THE SEVEN CLEAN WILD UNGULATE SPECIES AND THEIR IDENTIFICATION ACCORDING TO THE ARCHAEOZOOLOGICAL EVIDENCE

Species name in the HB	First identification	Second identification
אֵיִל 'ayyāl	<i>Cervidae</i>	<i>Dama mesopotamica</i> <i>Cervus elaphus</i>
צְבִי ṣəbî	<i>Gazella sp.</i>	<i>Gazella sp.</i>
יַחְמוּר yahmûr	<i>Buselaphus alcelaphus</i>	<i>Capreolus capreolus</i>
אֶקוֹ 'aqqô	<i>Capra ibex (nubiana)</i>	<i>Capra ibex (nubiana)</i>
דִּישׁוֹן dišōn	<i>Oryx leucoryx</i>	<i>Bos primigenius</i>
תֵּ'וֹ תֵּ'וֹ tē'ô	<i>Bos primigenius</i>	<i>Buselaphus alcelaphus</i>
זֶמֶר zemer	Wild goat or Wild sheep	Giraffe or Wild goat or Wild sheep

TABLE 5: SUMMARY OF CLEAN UNGULATE SPECIES SUGGESTED IN THIS STUDY

Species name in the HB	Common Name	Species Name
אֵיִל 'ayyāl	Fallow deer Red deer Roe deer	<i>Dama mesopotamica</i> <i>Cervus elaphus</i> <i>Capreolus capreolus</i>
צְבִי ṣəbî	Mountain gazelle Dorcas gazelle	<i>Gazella sp.</i>
יַחְמוּר yahmûr	Hartebeest	<i>Alcelaphus buselaphus</i>
אֶקוֹ 'aqqô	Nubian ibex	<i>Capra ibex (nubiana)</i>
דִּישׁוֹן dišōn	Arabian oryx	<i>Oryx leucoryx</i>
תֵּ'וֹ תֵּ'וֹ tē'ô	Aurochs	<i>Bos primigenius</i>
זֶמֶר zemer	Mouflon Wild goat	<i>Ovis aries</i> <i>Capra aegagrus</i>

IMAGES

אַיָּל 'ayyāl - Fallow Deer



אַיָּל 'ayyāl Red Deer



שְׂבִי šēbī Mountain gazelle



צָבִי ṣəḇî Dorcas gazelle



יְהֻמֹּר yaḥmûr Hartbeest



אֶקוּ 'aqqô Nubian ibex



דִּישׁוֹן dišōn Arabian oryx



אֵרֹאֵם tē'ô Aurochs



זֶמֶר zemer Mouflon



זֶמֶר zemer Wild Goat