

Shafan—Hyrax or Rabbit?

by Jonathan S. Ostroff, Ph.D.

Could the *shafan* be the rabbit?

R. Slifkin's answer is no. He concedes that many Rishonim understood the *shafan* to be the rabbit, but summarily dismisses their position. He claims that, as Europeans, the Rishonim were unaware of the fauna of the Middle East. On his blog R. Slifkin writes:

The original study was by Tchernov [2000], who notes that the hare is “the only endemic species of lagomorph known from the Middle East since the Middle Pleistocene”.¹

Lagomorphs include hares, rabbits and pikas. The study by Tchernov *et al.* claims that hare remains have been found in the Middle East, but not the remains of rabbits. In addition, according to R. Slifkin, early authorities such as Rav Saadia Gaon (who lived in the Middle East) and Ibn Janach (about 100 years later) identified the *shafan* as the hyrax.

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1. <http://www.rationalistjudaism.com/2013/01/where-are-pandas-penguins-and-polar.html>, accessed 21 July, 2013.

Traditional sources for identifying the *shafan* as the hyrax include Rav Saadia Gaon (882-924CE), Ibn Janach and *Tevuos Ha-Aretz*. [N. Slifkin, *The Camel, the Hare and the Hyrax*, p88, 2011, 2nd edition]

Accordingly, R. Slifkin claims that the *shafan* is definitively the hyrax. Even though the hyrax does not regurgitate its food, the Torah calls it *maale geira* because its chewing motion superficially resembles that of ruminants, even though the chewing action is not needed for nutrition. R. Slifkin's interpretation is somewhat puzzling.² If the hyrax is not actually *maale geira*, why is it so described? Would it not be more reasonable for the Torah to disabuse people of this fiction and explain that the reason the hyrax is not kosher is because it is neither split-hooved nor *ma'alei geira*?

This fictional criterion also poses a problem as it would apply to other animals not mentioned in the Torah's exhaustive list (e.g. the kangaroo). As a consequence, R. Slifkin is forced to assert that the Torah's list is limited to just those animals in the general region surrounding the land of Israel. This contradicts Chazal's exegesis of the applicable verses in the Torah in which the Almighty (the "Ruler of His World") uniquely identifies the four types possessing a single sign of purity.³

1. What is the *Shafan* According to Rav Saadia and Ibn Janach?

Dr. Betech's recent book has raised important challenges to R. Slifkin's thesis.⁴ First, R. Slifkin erred when he wrote that Ibn Janach identified

2. According to *Sifra* (*Shmini*, 4:6) the animals with only one sign are listed because one might have thought that any one of the two *simanim* is sufficient to make the animal kosher. See Malbim. But if the *shafan* is not really *maale geira*, why list it as having an attribute it does not have?

3. תלמוד בבלי מסכת חולין דף נט/א: דאמר רב חסדא היה מהלך במדבר ומצא בהמה שפרסותיה חתוכות בודק בפיה, אם אין לה שינים למעלה בידוע שהיא טהורה אם לאו בידוע שהיא טמאה, ובלבד שיכיר גמל, גמל ניבי אית ליה, אלא ובלבד שיכיר בן גמל, לאו אמרת איכא בן גמל איכא נמי מינא אחרינא דדמי לבן גמל? לא ס"ד דתני דבי ר' ישמעאל ואת הגמל כי מעלה גרה הוא, שליט בעולמו יודע שאין לך דבר מעלה גרה וטמא אלא גמל, לפיכך פרט בו הכתוב "הוא" (רש"י: וחבריו האמורים בפרשה).

According to one opinion in the Talmud, there is a 5th species called *shesua*.

4. Drs. Yitzchak Betech and Obadia Maya, *The Enigma of the Biblical Shafan*, 2013.

the *shafan* as the hyrax. This is what Ibn Janach actually wrote:

“And the *shafan*”. It is the *wabr*, an animal the size of a cat, which is found [only] a little in the East, but is abundant among us. Nevertheless the masses do not know it by that name, but by the name *conilio*, a Spanish name (for rabbit). [Ibn Janach, *Sefer Hashorashim*, translated from the Arabic]⁵

R. Slifkin’s error is significant. Ibn Janach unambiguously identifies the *shafan* (Arabic: *wabr*) as a rabbit. R. Slifkin’s response is that Ibn Janach (living in Spain) did not know of the hyrax, but he did know of the rabbit. Some people called the rabbit by the term *wabr*, and so he assumed that this was the meaning of R. Saadia’s term.

Given the conflicting sources, it is quite possible that the term *wabr* was used for both the hyrax and the rabbit. In our context, Ibn Janach was a Torah authority, a grammarian, and an expert in Arabic. He lived soon after the times of Rav Saadia Gaon and was apparently aware of the fauna of the Middle East. He writes that the *wabr* (rabbit) is abundant where he lived (in Spain) but scarce in the East (where Rav Saadia lived). This matches the rabbit very well, but rules out the hyrax, which is hardly found in Spain.

This also raises the issue of what Rav Saadia meant by *wabr*. R. Slifkin writes that *wabr* “is the most common and widespread Arabic name for the hyrax.”⁶ Lane’s Arabic-English Lexicon, published in the 19th century, has definitions taken from older Arabic dictionaries (some from the time of Rav Saadia) and has the following entry for *wabr*:

Second sub-entry in Lane:⁷

وَبْر [Wbr] . . .

[The *hyrax Syriacus*; believed to be the animal called in Hebrew *shafan*] a certain small beast, (Lth, T, S, Mgh, Msb, K,) like the cat, (Msb, K,) or of the size of the cat, (Lth, T, M, Mgh,) or smaller than the cat, (S,) of the beasts of the desert, (M,) of a dust-colour, (Lth, T, Mgh, Msb,) or of a hue between dust-colour

5. See Enigma, p104.

6. *The Camel, the Hare and the Hyrax*, p88, 2011, 2nd edition, p89, based on H.B. Tristram, *The Natural History of the Bible*, 1883.

7. <http://www.studyquran.org/LaneLexicon/Volume8/00000169.pdf>, accessed July 21, 2013. From: Edward W. Lane, *An Arabic-English Lexicon*, Williams and Norgate, 1863.

and white, (. . .) or white, (TA,) *having beautiful eyes*, (Lth, T, Mgh,) or *having eyes bordered with black, or very black eyes*, (xxx, Msb,) *having no tail*, (S, Msb,) or *having a small tail*, (Mgh,) . . . ”.

Fourth sub-entry in Lane:

وَبْر [Wbr] A camel *having much* وَبْر [Wbr] [i. e. *fur, or soft hair*]; (S, M, A, Msb, K;) and in like manner, a hare or rabbit, and the like; (K;) . . .

Many of the older dictionaries are no longer available and thus the complete entry cannot be checked. But Lane does quote snippets from these dictionaries. The older dictionaries refer to the *wabr* as cat-like, of a white or dust colour, and having no tail or a small tail. It is Lane [in the square brackets] who interprets these dictionaries to be describing the hyrax. But Lane does not state how he knows this, as the cat-like attributes may also refer to the rabbit.

In the fourth-sub entry, *wabr* refers to animals having much hair, such as the camel, the hare or the *rabbit*. So, ultimately, Lane’s lexicon does not rule out the rabbit. In fact, *wabr* as rabbit is explicitly allowed.

As we have already mentioned, the claim that Ibn Janach had no awareness of the fauna of the Middle East is unsupported. It is one thing for R. Slifkin to conjecture that the Rishonim living in Christian France and Germany had no awareness of the fauna in the Middle East. But it is quite something else to conjecture the same for the early Rishonim living in Arab Spain, and living in the cultural milieu of the Arab Caliphate.

The Moorish conquest and rule of most of the Iberian peninsula and the open Moslem imposition of the Arab language and culture upon it served to open Spain to the influence of its neighbours on the shores of the southern Mediterranean. The *open channels of communication to the entire Moslem world of that day* acted as a homogenizing factor giving a certain sense unity to the Jewish communities in this region. *Migration to and fro from the diverse and far-flung corners of the Arab Caliphate strengthened this tendency.* [Rabbi Hersh Goldwurm, *The Rishonim*, Artscroll, revised edition, p16-17, 2001. Emphasis added.]

To take another example. R. Tovyah ben Eliezer, author of *Lekach Tov*, was originally thought to have lived in Mainz. However, according to the editor of the Vilna edition (S. Buber) he lived in Kastoria Greece, which is why he was

familiar with the state of affairs in the Middle East.⁸ This also means that his knowledge of the fauna of the Middle East cannot rightly be discounted. R. Tovyah states:

פסיקתא זוטרתא (לקח טוב) ויקרא פרשת שמיני דף כט עמוד ב: את זה תאכלו.
לא הוצרכו לפרט את אלו, אלא מפני שיש להן סימני טהרה. שפן מין חיה הוא
וטלפו כשל חתול, וכן הארנבת טלפיה דומות לחתול.

Shafan is a type of *chaya* and its foot is like that of the cat. [*Lekach Tov*]

R. Tovyah writes that the distal foot of the *shafan* is cat-like. This is true of the rabbit (and *arneves*=hare). As a lagomorph, it moves about as if walking on its toes like a cat (digitigrade locomotion). However, the hyrax has hoof-like claws (stumpy toes with four hoof-like nails on each front foot and three on each back foot) and is plantigrade. Thus, early authorities such as Ibn Janach and Lekach Tov provide clear unambiguous indicators that the *shafan* is the rabbit and not the hyrax.

Also, the *shafan* is described as a leaping creature טפזא (Onkelos, Leviticus 11:5). Rabbits are natural-born hoppers and have saltatorial locomotion.⁹

2. In What Way Is a Rabbit *Maale Geira*?

In what way is the rabbit a *maale geira*? We can understand how cows, sheep and goats can be described as *maale geira*. After all, these animals are ruminants that chew the cud. Cud refers to that portion of food that returns from a ruminant's stomach to the mouth to be chewed for the second time. Is there some analogous process to rumination that can be applied to the rabbit and the hare? The answer is yes.

8. "But as in the course of his work Tobiah often attacks the Karaites [mostly living in the Middle East] and, besides, manifests a thorough knowledge of Muslim customs. Samuel Judah Löb Rapoport, in his biography of Eleazer Kalir, note 33 (in *Bikkure ha-'Itim*, x. 122-123), concluded that toward the end of his life Tobiah settled in Palestine." [http://en.wikipedia.org/wiki/Tobiah-ben_Eliezer, accessed Aug. 30, 2013].

9. See Musaf HaAruch: מוסף הערוך ערך טפז, and the *haskama* for *Enigma of the Biblical Shafan* by Rav Shlomo Miller, *Sblita*, Rosh Kolllel in Toronto. The *haskama* may be viewed at <http://kolllel.com/sites/default/files/RSM-Shafan-Haskama.pdf>.

Rabbits are herbivores. Their diets consist of plant matter which is rich in cellulose, a polysaccharide that is a major component in the rigid cell walls in plants. Cellulose is resistant to chemical digestion. Rabbits and hares overcome this problem by practicing a qualified form of *cecotrophy* which involves a unique and indispensable digestion process—these animals re-ingest nutritious soft (but not hard) feces and recycle their food.

A good and well-known example is caecotrophy (reingestion of soft faeces or caecotrophs) by leporids. Leporids produce two types of faeces (soft and hard faeces). Soft faeces originate from the fermented materials in the caecum, rich in vitamins and microbial proteins. All soft faeces are ingested at excretion directly from the anus, hence not normally exposed to our observation. The reingested soft faeces are digested in the stomach and small intestine (Cork, 1994). **If prevented from reingesting soft faeces, the Domestic Rabbit (*Oryctolagus cuniculus*) on a normal diet develops malnutrition** (Morot, 1882; Olsen & Madsen, 1944). **Ingestion of soft faeces is thus an indispensable part of the digestion process.**¹⁰

From a nutritional standpoint *cecotrophy* is similar to rumination. When a cecotrope is eliminated, the rabbit bends its head down to its anus and directly raises these soft pellets, rich in nutrients and proteins, from the anus into its mouth. The rabbit lightly chews the cecotrope with its mouth slightly open, before swallowing. Drs. Beteck and Maya suggest that the Torah term *maale geira* includes *cecotrophy* under the general heading of rumination. Like the other eleven ruminants listed in the Torah, the rabbit and the hare have a specific way of chewing (ectental—i.e. side-to-side), and like the other ruminants they re-digest their own semi-digested food as a nutritional imperative. These two characteristics are the hallmark of rumination. Together they serve to increase the efficient utilization of available food.

R. Slifkin himself admits that cecotrophy in hares is a legitimate—albeit not straightforward—explanation of *maale geira* due to the fundamental similarity

10. Hirofumi Hirakawa. “Coprophagy in leporids and other mammalian herbivores”. *Mammal Review*. 2001;31(1):61–80. Emphasis added.

of cecotrophy to rumination.¹¹ It is likewise legitimate to call the rabbit a *maale geira*.

3. The High Hills Are For the Ibex, the Rocks Are a Refuge For the Shefanim

In his letter to *Dialogue*, R. Slifkin writes: “But to reiterate the main point: When David HaMelech writes that “The high hills are for the ibex, the rocks are a refuge for the shefanim,” he was not describing the behavior of animals from southern Africa. Instead, he was referring to the animal in the immediate vicinity of the ibex, which characteristically hides under rocks: the hyrax.”

R. Slifkin believes that all the phenomena described by King David in Psalms, must have been local to the land of Israel.¹² He asks “Where are the pandas, penguins and polar bears of Psalms?” But the real issue is not *locality* but *familiarity*. I agree that if Jews were not familiar with pandas then they probably would not be mentioned in Psalms. But, the *shafan* is specifically mentioned in the Torah, and the verses describing it are central to the description of the laws of *kashrut*. In fact, the Midrash *Tanchuma* deduces that *all* the animals were brought in front of Moshe:

The Holy One grasped each and every species, showed it to Moshe and said “This eat, and this do not eat,” for it says, “*This* is the creature you may eat,” and “*This* is the creature you may not eat.” And if you find it incredible that the Holy One made them pass before Moshe, [remember that] **in the same way, the Holy One made all the creations He created pass before Adam . . . the ox . . . the camel . . . the donkey . . . and likewise each and every species . . .** So if the Holy One made every creature pass before Adam, are you surprised

11. In *The Camel, the Hare and the Hyrax*, R. Slifkin writes: “Cecotrophy is therefore fundamentally similar to rumination; indeed, some works refer to it as ‘pseudo-rumination.’” (p134) “Similarly, the Torah is not stating that the hare chews the cud, but rather that it is in the family of animals known as ‘cud-chewers’ due to the fundamental similarities of pseudo-rumination [cecotrophy] to rumination. This is not a straightforward explanation of *maale geira*, but it is legitimate” (p136, under the heading “Can the Term Ma’aleh Gerah refer to cecotrophy?”).

12. <http://www.rationalistjudaism.com/2013/01/where-are-pandas-penguins-and-polar.html>, 30 Aug. 2013

that the He **likewise** showed [them] to Moshe to exhort Israel regarding the kosher and non-kosher?¹³

So knowledge of the identifying characteristics of the *shafan* would have been part of the oral transmission, whether the *shafan* is found in Israel or Southern Africa. In *Barchi Nafshi*, King David describes the whole scope of creation with *ruach hakodesh*. For example, the beginning of the Psalm reveals a new insight not explicit in Genesis: נוֹטָה שָׁמַיִם כַּיְרִיעָה—“He stretches out the heaven like a curtain,” meaning that the atmosphere was formed on the second day via the light created on the first day of creation.¹⁴ Jews in Israel at the time of King David did not witness the formation of the atmosphere like a “curtain”. King David thus expands on their knowledge either through *mesora* or *ruach hakodesh*. According to Rambam, Psalms was written with the second level of *ruach hakodesh*:

The second degree [of prophecy] is this: A person feels as if something came upon him, and as if he had received a new power that encourages him to speak. **He treats of science, or composes hymns, exhorts his fellow-men, discusses political and theological problems; all this he does while awake, and in the full possession of his senses.** Such a person is said to speak by the holy spirit. **David composed the Psalms,** and Solomon the Book of Proverbs, Ecclesiastes,

13. מדרש תנחומא שמיני פרק ח: **זאת החיה אשר תאכלו:** שלשה דברים נתקשו למשה והראם לו הקב"ה באצבע ואלו הן מעשה המנורה והירח והשקצים . . . השרצים מנין שנא' וזה לכם הטמא בשרץ השורץ על הארץ תפש הקב"ה כל מין ומין והראה לו למשה וא"ל זה אכול וזה לא תאכל שנאמר זאת החיה אשר תאכלו וזה אשר לא תאכלו ואם אתה תמה על הדבר על שהעבירן הקב"ה לפני משה כד העבירן הקב"ה לפני אדם הראשון **כל בריות שברא** וא"ל מה שמו של זה והוא אומר לו שור מה שמו של זה והוא אומר לו **גמל** וכן חמור וכן כל דבר ודבר ומנין שכן כתיב (בראשית ב) וכל אשר יקרא לו האדם נפש וגומר לאחר שקרא לכולן שמות א"ל הקב"ה ואני מה שמי א"ל ה' זשה"כ אני ה' הוא שמי (ישעיה מב) הוא שמי שקרא לי אדם הראשון הוא שמי שהתניתי ביני לבין בריותי **ומה אם אדם הראשון העביר הקב"ה את כל הבריות לפניו משה שהקב"ה מבקש שיזהיר את ישראל על הטהרות ועל הטמאות** אתה תמה שהראה לו הקדוש ברוך הוא **בן** שכתוב וזאת החיה אשר תאכלו וזה אשר לא תאכלו שא"ל הזהר את ישראל שלא לאכול דברים טמאים.

14. See Ibn Ezra, Radak and Malbim:

מלבי"ם על תהילים פרק קד פסוק ב—חלק באור הענין. נוטה שמים כיריעה—אחר מאמר ויהי אור בא מאמר ויהי רקיע, ויקרא אלקים לרקיע שמים, וכבר החזקתי בפ' בראשית כדעת המפרשים ששם רקיע נאמר על מקום עליית האדים בעיגול הנשימה ששם יתהוו העננים והמטר, ושם בארתי שע"י האור נעשה הרקיע, ר"ל התחילו האדים לעלות ונקבע מקום הסגריר ששם יתקבצו בעבים, וזה נוטה שמים כיריעה:

and the Song of Solomon by this spirit; . . . This class includes the seventy elders of whom it is said, “And it came to pass when the spirit rested upon them, that they prophesied, and did not cease” (Num. xi. 25): also Eldad and Medad (ibid. ver. 26): furthermore, every high priest that inquired [of God] by the Urim and Tummim; on whom, as our Sages say, the divine glory rested, and who spoke by the holy spirit; . . . [*Moreh Nevuchim*, Friedlander translation, II:45, emphasis added]

But note that we do not need to go to South Africa for rock rabbits. Bunyoro rabbits (*Poelagus marjorita*) are found in rocky habitats as far north as Sudan in association with the hyrax:

Habitat and Ecology: *Poelagus marjorita* exists primarily in moist savanna grassland, woodlands with rocky outcrops, and less prominently in forested areas (Duthie and Robinson 1990). They often dwell in rock crevices, and are associated in some areas with hyrax habitat (Kingdon 1974). . . .

Range Description: The accounts are restricted to Uganda, southern Sudan, northeastern DRC, and eastern (and possibly central) Central African Republic (Happold and Wendelen 2006).¹⁵

It is also reported that you can see the ibex, the hyrax and the rabbit in the Red Sea area of Egypt.

Today the area [mountain of porphyry] is uninhabited except for the occasional Ma’aza Bedouin grazing his camels. **Ibex**, **hyrax**, and **rabbit** live here now. Around water holes, trumpeter bullfinches, desert larks, and mourning chats flock in *sayaal* trees (*Acacia raddiana*) and the wispy-needled *yasar* trees (*Moringa peregrina*). In the fall, thousands of white storks cross overhead, riding thermal currents on their way from the Sinai to central Africa. [Via Porphyrites, *Stonexus magazine*, Louis Werner, Issue 5, Summer 2004, p. 64-65. Emphasis added.]

How long have rabbits been in Egypt and the Sinai? The date is undetermined, but Mahmoud (1938) calls the Sinai Gabali native Egyptian rabbits.

15. <http://www.iucnredlist.org/details/41292/0>, accessed 21 July, 2013.

(i) Breed name synonyms: El-Gabali, Al-Gabali. (ii) Strains within breed: Gabali of Sinai, Gabali of the western desert (Khalil, 1999) *Origin of the breed*: Sinai and eastern and western (in the north coast belt) deserts of Egypt. They are raised by the Bedouins for their food. They are referred to by Mahmoud (1938) as **Native Egyptian rabbits**.¹⁶

R. Slifkin writes:

And I can give you plenty of sources that I am a native Englishman. For the last three generations! . . . If you want to say that they were already released and established in Egypt in Biblical times, the onus of proof is on you [Dr. Betch]. Then, of course, you also have to bring evidence that they were in Israel.¹⁷

Why is the onus of proof on Dr. Betch? When biologists call a species “native” to an area they mean that the species originated in that area. So the onus of proof now shifts on to R. Slifkin to show that rabbits are not native to Egypt, but were introduced. Even if one argues that rabbits originated in Spain, it is believed that already very early on, rabbits had spread from Spain to North Africa.

The oldest anthropogenic transportation of a mammal could be the introduction of the rabbit to North Africa. The Palaeolithic material attributed to this species is represented by two questionable old findings from Algeria and Morocco (Romer, 1928; Gobert & Gaufray, 1932). The abundance of the species in Neolithic deposits (Romer 1928; Hopwood & Hollyfield 1954) suggests an early introduction from Iberia, where the species has been known since at least the Mindel. [C. Cheylan, Pleistocene turnover, current distribution and speciation among Mediterranean mammals, in *Biogeography of Mediterranean Invasion*, R. H. Groves, F. Di Castri (eds.), p247-248, Cambridge 1991).

At the other end of the Sahara, species have travelled northwards following the Nile valley; these species are likely to be found in the Israel, sometimes

16. Mahmoud, I.N. (1938). Bases of Veterinary Medicine, 2nd edn. Cairo University, Egypt (in Arabic). This source was taken from: E. A. Afifi, “The Gabali Rabbits (Egypt)”, *Options Méditerranéennes. Série B: Etudes et Recherches*. 2002;38:55-64. Emphasis added. See Enigma p98 and <http://www.iamz.ciheam.org/medrabbbit/docs/gabali.pdf>.

17. <http://www.rationalistjudaism.com/2013/01/where-are-pandas-penguins-and-polar.html>, accessed 21 July 2013.

reaching Lebanon and Southern Turkey: e.g. species of *Mellirova*, *Genetta*, *Herpestes*, *Procavia*, *Alcephalus*, and *Acomys*. [*ibid.* p. 239]

So rabbits arrived on the African continent early on. Cheylan explicitly identifies a Sahara migration route going north through the Nile Valley and into Israel. One of his examples is the genus *Procavia* which includes the Cape hyrax. Given that the hyrax and the rabbit are found in the same habitat, this is a possible route for rabbits to get to Egypt and ultimately Israel. And furthermore, just as the ibex and the rabbit are reportedly found together in Egypt today, it is perfectly reasonable to accept that they were there in Biblical times too. And given that there are species of rabbits (such as those in South Africa and southern Sudan) that live in rocky areas, rabbits (like the hyrax) clearly possess a built-in adaptability to a variety of terrains. Thus the rabbit is entirely consistent with the behaviour described in Rabbi Slifkin's *pasuk* from *Borchi Nafshi*.

4. The Fossil Record

Given that there are rock rabbits in the southern Sudan and Sahara migration routes going north, following the Nile valley to Israel we cannot rule out either knowledge, or actual presence, of rabbits in Biblical Israel.

Thus, R. Slifkin is forced to refer us to the Tchernov [2000] paper stating that the hare is “the only endemic species of lagomorph known from the Middle East since the Middle Pleistocene.” Tchernov *et al.* are experts in the zooarcheology of the Levant and thus their opinion seems to count heavily in R. Slifkin's favour. However, we may always ask what evidence do Tchernov *et al.* advance for their claim. Several months ago, Rabbi Coffe emailed Dr. Theodora Bar-El (at the Alexander Silberman Institute of Life Sciences Hebrew University of Jerusalem) for clarification. Here is his letter.

I am currently doing some research in lagomorph paleontology specifically as relates to Israel and came upon your paper “Lagomorph Remains at Prehistoric Sites in Israel and Southern Sinai” which appeared in Vol. 26 N1 of the science journal *Paleorient* (2000). In your paper you document six locations in Israel (Hayonim Terrace, Netiv Hagdud, Ohalo II, and the Caves of Hayonim, Kebara and Nahal Hemar) where lagomorph remains were unearthed. These remains

are identified in your paper as belonging to the species *Lepus capensis* (Cape Hare) and in your abstract you write that *Lepus capensis* “has been the only species of lagomorph known from this region”. I’m sure you are very busy but I have two questions which relate to your presentation. I tried to contact your colleague (and collaborator on this project) Dr. Eitan Tchernov but unfortunately he has since passed away so and I would be very grateful if you managed to find some time to provide me with some clarification. The first issue relates to methodology so I’ll begin with that.

1) On page 95 under the heading Materials and Methods, you write as follows: “For identification and taxonomic appraisal, bone fragments were compared with those of *Lepus capensis* from the Comparative Collection of Mammals at the Hebrew University of Jerusalem. **Schmid’s Atlas of Animal Bones** was also referred to.” My question is, were there any methods utilized to distinguish between the Leporid species *Lepus capensis* and other Leporid species such as, say, *Lepus timidus* (mountain hare) or *Oryctolagus cuniculus* (European rabbit)? After all, their skeletons are practically identical. In fact, although Schmid’s Atlas deals specifically with eight animals (Horse, Ox, Sheep, Pig, Wolf, Bear, Beaver and Hare), the author writes that “**the hare stands for all Leporidae**” (pg 11, under the section Sequence of the Animals). Since all hares and rabbits fall under this category, is it possible that some of the bone fragments you found may indeed have belonged to another species from the Leporid family?

2) As mentioned earlier, you write that “Since the Middle Pleistocene the cape hare (*Lepus capensis*) has been the only species of lagomorph known from this region.” What I am wondering is, how reliable are the results of nine locations (several of them caves) over the size of such a region (roughly 30,000 sq. kilometers)? How authoritative are the conclusions based on these results? When you write that the cape hare is the only known species in the region, do you mean to say that it is reasonable to conclude that no other species of lagomorph occupied this region in the past, or do you mean to say that as of now (the time of your paper) there are simply no other known species of lagomorph that have been documented in the strata?

Looking forward to your response, I remain, sincerely yours,

Indeed, as Schmid states, the bones in her atlas stand for all *Leporidae* which includes the hare and the rabbit. Thus the atlas cannot be used to specifically distinguish the hare from the rabbit. No evidence is presented in the Tchernov *et al.* paper that indicates how the authors made the identification that the

bones they dug up were specifically that of the hare. This does not mean that they did not do such a determination. It is just that the paper itself does not present the relevant evidence. There is a gap between claim and evidence for the claim.¹⁸

So are there methods that might be used to distinguish between the hare and the rabbit? Dr. Beteck writes:

However, because of the adaption of *Lepus* towards fast locomotion, reflected in an elongation of the distal parts of the hind limbs, and the digging adaptation of *Oryctolagus*, reflected mainly in the forelimbs (see e.g., Sych, Donard, Fladerer, Fostowicz-Frelik) differences between the two genera in the proportions of several postcranial elements are obvious and can be used to distinguish them. [*Enigma*, p92]

Nevertheless, given the similarity of the hare and rabbit, this determination is not always an easy task.

The differences between the living species of rabbits and hares are subtle, even though we have the whole animal for comparison. Since most fossil and sub-fossil finds consist of isolated teeth or small fragments of skull or other bone, the difficulties of confidently distinguishing species in the fossil record is acute. The problem is exacerbated by the burrowing ability of the rabbit and consequent difficulty of recognizing remains that have thereby been intruded into earlier strata. ["Taxonomy and origins", G.B. Corbet, p4, in *The European Rabbit: The History and Biology of a Successful Colonizer*, edited by Harry V. Thompson and Corolyn M. King, Oxford University Press, 1994. Emphasis added]

As Dr. Beteck writes, Wible has studied 59 osteological cranial characteristics among lagomorphs, and found that *Lepus capensis* (cape hare) and *Pronolagus crassicaudatus* (the rock rabbit) differ only in one of them, i.e. in the size and location of the sphenopalatine vacuity (SPV). Thus, some of the fossils found in Biblical Israel and indiscriminately identified as fossils of *Lepus capensis*, could indeed correspond to *Pronolagus crassicaudatus*, a species

18. In her atlas, Schmid writes: "To differentiate between the hare, blue hare and the wild rabbit, see the corresponding literature (Mohr 1938; Koby 1959)." However, in their paper, Tchernov et al. nowhere refer to Mohr and Koby.

which dwells specifically in rocky habitats. [Wible J.R. “Cranial Osteology of the Lagomorpha”. *Bulletin Carnegie Museum of Natural History*. 2007; 39:213-234.]

Another major issue is that the fossil record for Lagomorphs is incomplete. Many living lagomorph genera lack a fossil record.

Only 12 genera and about 75 lagomorph species are still living in recent times, most of them almost devoid of paleontological record. (p27)

(8) Many living lagomorph genera lack a fossil record. The others are mainly recorded by extinct species, indicating a recent renewal of the lagomorph fauna. (p44, summary)

Living leporids with a palaeolagine-type p3, which appear as a natural group in some molecular phylogenies, are poorly represented in the fossil record. Among them, the Japanese *Pentalagus* is the only one with a fossil relative, +*Pliopentalagus* from the European and Asiatic Pliocene. It assesses the refuge status of the surviving insular Amami rabbit. From the remaining palaeolagine-like living taxa (*Bunolagus*, *Pronolagus*, and *Romerolagus*), only *Pronolagus* has been documented by fossil remains from South African Plio-Pleistocene. (p. 37-38)

[*The Lagomorph Fossil Record and the Origin of the European Rabbit*, Nieves Lopez-Martinez, in *Lagomorph Biology*, Springer-Verlag, 2008, pp 27-46. Extinct taxa have a ‘+’ preceding their names. Emphasis added]

So, for example, Lopez-Martinez mentions the genus *Bunolagus* as lacking documentation in the fossil record. The riverine rabbit (*Bunolagus monticularis*), also called the bushman rabbit, is the only living member of this genus. This rare and endangered species of rabbit, living in the Karoo (in South Africa), has no fossil record. As another example, there is a rare species of rabbit in Mexico (genus *Romerolagus*) that has no fossils record.

5. Conclusion

In summary, the hyrax is disqualified *ab initio* as it is not a *maale geira*. The hyrax is not a ruminant. It does not have an alternate regurgitation mechanism such as cecotrophy, analogous to that of ruminants. It is doubtful that

the hyrax practices merycism, and certainly not as a nutritional imperative.¹⁹

The fossil record is known to be incomplete and cannot be used to exclude the rabbit from Biblical Israel. There are many living species of lagomorphs for which there is no rock record. The differences between the living species of rabbits and hares are subtle, even though we have the whole animal for comparison. Since most fossil and sub-fossil finds consist of isolated teeth or small fragments of skull or other bone, the difficulties of confidently distinguishing species in the fossil record is acute. No evidence has yet been presented that appropriate measures have been taken to confidently identify lagomorph fossils as hares rather than rabbits. Even if such measures have been taken, is the sample size sufficiently large?

The most reasonable candidate for the *shafan* is the rabbit, as per our *mesora* going back to early authorities such as Ibn Janach, Lekach Tov and many others. The Talmud states that the Almighty, Ruler of His world, knows that there is no creature that is *maale geira* and not kosher except for the camel, hare and *shafan*. With the *shafan* now identified as the rabbit, the Torah's list of four exceptions is exhaustive, as identified by *Chazal* in their exegesis of the relevant verses in the Torah.

And if the *shafan* is the rabbit as per our *mesora*, then there were indubitably rabbits in rocky terrain in Biblical Israel or elsewhere, perhaps living in the same habitat as the ibex. The ibex, the hyrax and the rabbit are reported in the same habitat in mountains of the Red Sea area. There are rock rabbits as far north as Sudan and ancient Sahara migration routes north to the Nile valley

19. "Hyraxes are a unique order of small mammal, because they have a multi-chamber stomach which frees them from the act of chewing cud to extract nutrients from plant material. Each chamber in the stomach has symbiotic bacteria that allows them to break down plant material and also digest fiber. Hyraxes often make an antagonistic chewing motion, but this is different than the act of chewing cud, as it is not done for dietary purposes." <http://thewebsiteofeverything.com/animals/mammals/Hyracoidea/>, accessed July 23, 2013. "Hyraxes are herbivores; their stomach is simple, but digestion is aided by microbiota in a caecum at the anterior end of their colon and a colonic sac positioned just anterior to the distal colon (Bjornhag et al. 1994)." Terry A. Vaughan, James M. Ryan, Nicholas J. Czaplewski, *Mammalogy*, Jones & Bartlett Publishers, p142, 2011).

Leporids (rabbits and hares) are entirely herbivorous and eat a wide variety of grasses, forbs, and shrubs. They engage in cecotrophy, i.e. they reingest fecal pellets with essential nutrients (proteins and vitamins) from plant material as it passes through the alimentary canal a second time.

and Israel. This fits in with King David's description of the high mountains as the habitat of the wild goats (ibex) and the rocks as a refuge for the *shafan* (rabbit). At first glance, the remote and barren mountains appear to serve no purpose; but in fact they were created to provide a habitat for the ibex. Even the rocks and boulders which litter the wilderness are created with plan and purpose to protect the fragile rabbits from the predatory birds which seek to swoop down on them (see *Radak*).

מה רבו מעשיך ה' כלם בחכמה עשית מלאה הארץ קנייך

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