Present and ancient numerals of sheep and goats in Oman: What is in the numbers?

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ABSTRACT:

In Oman, the numerals of sheep and goats in the present time reflect a clear disparity in both animals' populations numbers. The Agricultural Census 2018 stated that the livestock of Oman contains 2,302,000 goats and 605,000 sheep. The divergence between the two animals is attracting attention and notice through the unexpected and conspicuous population numbers. In addition, archaeological excavations in Oman and the United Arab Emirates indicated the same situation during prehistory.

This paper examines the discrepancy in the numbers of the sheep and goat populations in Dhofar region, southern Oman. There must be an explanation for this disproportion between goat and sheep in prehistoric and present times.

This is an attempt to find the compels and the conditions that characterize this discrepancy. It examines the environmental conditions in Dhofar for both animals and the preference of the traditional herdsmen in Dhofar over sheep and goat. Moreover, the paper examines the effect of copper in soil and grass on both animals and finally provides the archaeological record of the osteological remains of sheep and goat. The examination of these factors can possibly facilitate a reasonable analogy between the present and prehistoric situation.

KEYWORD: Sheep & Goat, Dhofar, Archaeological Excavations , Traditional Herdsmen , Osteological Remains, Copper In Soil & Grass, Prehistoric Times

الأعداد الحالية والقديمة لحيوان الضأن والماعز في عمان: ماذا تحكي لنا الأرقام؟

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الملخص:

في عُمان، تعكس أعداد الأغنام والماعز في الوقت الحاضر تباينًا واضحًا في أعداد كلا الحيوانين. فقد ذكر التعداد الزراعي لعام ٢٠١٨ أن الثروة الحيوانية في عُمان تحتوي على ٢,٣٠٢,٠٠٠ رأس ماعز و٦٠٥,٠٠٠ رأس ضأن. ويلفت التباين بين الحيوانين الانتباه والنظر من خلال الأعداد السكانية غير المتوقعة والواضحة. إضافة إلى ذلك، أشارت الحفريات الأثرية في عُمان والإمارات العربية المتحدة إلى نفس الوضع خلال عصور ما قبل التاريخ.

تبحث هذه الورقة في التباين في أعداد الأغنام والماعز في منطقة ظفار جنوب عُمان. ولا بد من وجود تفسير لهذا التباين بين الماعز والأغنام في عصور ما قبل التاريخ والحاضر.

وهذه الورقة محاولة لتحديد الدوافع والظروف التي أوجدت هذا التباين، حيث تهدف الورقة إلى دارسة الظروف البيئية في ظفار لكلا الحيوانين وتفضيل الرعاة التقليديين في ظفار بين الأغنام والماعز. وعلاوة على ذلك، فإن الورقة تهدف إلى دراسة تأثير النحاس في التربة والعشب على كل من الحيوانين، وأخيراً تقدم الورقة السجل الأثري للبقايا العظمية للأغنام والماعز. إن بحث هذه العوامل يمكن أن يساعد في التوصل إلى تشابه معقول بين الوضع الحالي والوضع كما كان في مرحلة ما قبل التاريخ.

الكلمات المفتاحية : الأغنام و الماعز ، ظفار ، التنقيبات الأثرية ، الرعاة التقليديين، البقايا العظمية ، النحاس في التربة و العشب ، عصور ما قبل التاريخ

INTRODUCTION

In the Sultanate of Oman, the numbers of goats (*Capra aegagrus hircus)* have always exceeded the sheep (*Ovis aries)* population. The gap between goats' numbers and sheep numbers is broad and conspicuous. The immense calculable of goats' numbers in contrast with the sheep is based on ascertainable by calculations of various organizations such as the World Organization for Animals Heath (https://rr-middleeast.woah.org/en/about-us/regional-members-of-woah/oman/) and the Country Report on the State of Animal Genetic Resources in the Sultanate of Oman (AnGR) (cf. https :// www.fao.org / 3 /a1250e / annexes / Country Reports / Oman_E.pdf).

According, to the statistics of the Country Report on the State of Animal Genetic Resources in the Sultanate of Oman (AnGR) (https://www.fao.org/3/a1250e/annexes/CountryReports/Oman_E.pdf) goats' population is 2,302,000, while sheep is 605,000, which comprises 26.29% and the difference is 1697000 animals.

This disparity in the populations' numbers must have been caused and shaped by certain conditions or factors. Was it the preference and choice of the animals' owners throughout time, or environmental specifications that caused these numbers? Did this divergence between sheep and goats took place in historic or prehistoric periods in Oman?

This paper examines the vast difference between sheep and goat numbers in Oman to find a rational elucidation for this disparity. To accomplish this objective, the paper focuses on Dhofar region in southern Oman. In this attempt, the goat herders in Dhofar are interviewed to finds possible reasons and causes for the discrepancy in the numbers of sheep and goats. This evident divergence in numbers of both animals reflects a reason for this condition. Therefore, this paper undertakes to find out an equitable explanation for this difference and lack of reasonable compatibility between the two populations of sheep and goat. Henceforth, before proceeding with this attempt, it would be useful to have a look at the statistics of the present sheep and goat populations in Oman, the comparison between the two animals, and the preference and choice of the Dhofari herdsmen.

Numerals of current sheep and goats in Oman

The noticeable differences in the livestock of sheep and goat were observed during field studies carried out by the author between the years of 1998 to 2012. It was perceptible that sheep are very few in the whole of Dhofar region.

First, the Agricultural Census 2018 stated that the livestock of Oman contains 2,302,000 goats and 605,000 sheep (https://www.muscatdaily.com/wpcontent/uploads/masthead_MD.png). Equally, World Organization for Animals Heath indicates that in Oman, goat population is 2762674 and sheep 617394 in numbers (https://rr-middleeast.woah.org/en/about-us/regional-members-of-woah/oman/).

Second, the Country Report on the State of Animal Genetic Resources in the Sultanate of Oman (AnGR: Animal Genetic Resources https://www.fao.org/3/a1250e/annexes/CountryReports/Oman_E.pdf).

Third, animal population in Oman were estimated and indicated sheep are 582.002016 and goats are 2,213.002016 (CEIC https://www.ceicdata.com/en/oman/number-of-animals/no-of-animals-sheep).

Consequently, three statistical examples cast light on the size of sheep and goat populations in Oman. For a close examination, the statistical numbers are in the following tables: Table 1, Table 2 and table 3.

Table 1: *The sheep and goat populations in Oman*

No.	Sheep	Goat
1	605,000	2,302,000
2	617,394	2,762674
3	582,002016	2,213.002016

Accordingly, the 2001 statistics, Oman SoW - State of the World (AnGR) Report (2020:2) provides the following proportions of the sheep and goat populations in the different regions of Oman (Tables 2 and 3):

Table 2: *The 2001 statistics of sheep and goat populations in the different regions of Oman:*

Sheep population 254000		
No.	**Region**	**Percentage in Oman**
1	Al Batinah North and South Governorates	31%
2	Ash Sharqiyyah South and North Governorates	22%
3	Adh Dhahirah Governorate	20%
4	Ad Dakhliyyah Governorate	13%
5	Muscat	5%
6	Ad Dakhliyyah Governorate	4%
7	Musandam	3%
8	Dhofar	2%

Table 3: *The sheep and goat populations in the different regions of Oman*

Goats were 998000 in Oman		
No.	**Region**	**Percentage in Oman**
1	Al Batinah North and South Governorates	23%
2	Ash Sharqiyyah South and North Governorates	19%
3	Dhofar	17%
4	Adh Dhahirah Governorate	15%
5	Ad Dakhliyyah Governorate	9%
6	Al Wusta Governorate	8%
7	Musandam	7%
8	Muscat	2%

Again, the following descriptions of the goat and the sheep in Oman are stated by the Oman SoW Report the Original Arabic Country Report on the State of Animal Genetic Resources (AnGR), of the Sultanate of Oman. The report presents the numbers of both animals in the following (https://www.fao.org/3/a1250e/annexes/CountryReports/Oman_E.pdf):

Goats local breed in Dhofar:

In the following, goats in Dhofar region (Plate 4, 5 and 6) have been described by State of the World (AnGR) Report (2020:2):

''Common colour is white with other occasional colours as black, dark brown, light brown and a mix of colours. It has a small body covered with short soft hair and weighing an average of about 26 kg at maturity. Legs are short and fine. Head is relatively small with some elongation. Nose is straight and ears are small and erected upward. Both males and females have horns. Tail is long and erected upward. The Zufari breed is found in the Southern Region of the Sultanate in plains and the mountain areas of Zufar governorate. The breed is raised under medium-input system and is widely used for meat and milk production'' (SoW: p. 7).

Sheep local breed in Dhofar:

Again, the sheep (Plate 1,2 and 3) has been described by State of the World (AnGR) Report (2020:2) in the following:

''White in color with short legs. The breed is found in Dhofar and used on a small scale to produce and meat under medium-input production system. There are two

imported sheep breeds, Chios and Najdi, whose presence is limited to experimental stations'' (SoW: p 8).

Therefore, why sheep population in Oman is small in comparison with the goat population. This minor proportion of sheep is not confined to a certain region, but throughout the Sultanate of Oman. Accordingly, this situation raises questions about the reasons or factors behind this situation. Why sheep population in Oman is minor, when compared with goats? There must be an explanation for this discrepancy in the sheep and goat populations in Oman. Moreover, as this question been raised earlier, did this population discrepancy between sheep and goats took place in historical or in prehistoric times?

Then, what is in the numbers? Is this difference caused by the reality that goats have greater advantage over sheep in travelling, grazing, milking, etc. Or is it the environment and the ecological conditions, which both ovine and caprine live in and share? If not, then is it the preference and choice of the Dhofari herdsmen?

At this stage, a comparison between ovine and caprine is necessary to cast light on the aptitude and fitness of both domesticates. It is well conceded that goats have greater advantage over sheep in its aptitudes and abilities. Given Dhofar environment, goats have greater advantage over sheep in travelling, grazing, and milking.

In Dhofar, herdsmen appreciate goats because this *Capra aegagrus hircus* can withstand and endure unfavorable environmental conditions. Goats are also adaptable to the harshness of the environmental conditions in Dhofar. Moreover, Dhofari herdsmen confirm that goats keep with the herd, and it is seldom when they go off the right path or route.

Then again, Dhofari herdsmen emphasis that sheep are known for a trend to go astray and get lost from the herd. Herding sheep necessitates constant and continuous close and cautious observing during grazing. Hence, herding sheep is hard when compared to goats. Goats on the other hand, do not spread while herding and can easily return home (cf. Swift 1973: 73). Moreover, goats can stand thirst more than sheep. Furthermore, goats are better than sheep in adapting in dry territories and long dry spells. Goats feed on acacia leaves, various spiny trees or shrubs and forbs, which are herbaceous plant and dry grasses.

In this context, Meadow (1971:139) compared the feeding requirements of both animals and concluded that sheep need herbaceous vegetation more than what is usual or expected and extra than goats. Equally, Dahl and Hjort (1976: 250) described the goats grazing habits in the pasturage as characteristic by quick movements and spread over a large area. Again, this is not part of the grazing ways of the sheep. For this reason, the Dhofari traditional herdsmen explain why sheep is not expedient in their pastoral economy.

This corresponds with what a herdsman from western Sudan stated in an informal interview about the sheep and goat. For these African herdsmen the sheep is usually unaware of any danger close by such as a predator. A goat herder in Dhofar pointed out that do not keep sheep with goats in a single herd. If they are together in one herd, the herd will scatter and go astray and away from the correct path or direction aimed by the herders.

According to the Dhofari traditional herders, the comparison between ovine and caprine in Dhofar environmental conditions clearly cast light on the aptitude and fitness of both domesticates. Given the environmental conditions of Dhofar, it is well conceded that goats have greater advantage over sheep in its aptitudes and abilities. Indeed, goats have greater advantage over sheep in travelling, grazing, and milking throughout the ecological seasons in Dhofar.

It is important to have a look at the environment and the ecological conditions, which both ovine and caprine live in and share. The focus will be on Dhofar region, where noticeable seasonal conditions caused by the mansoon winds. This region is inhabited by various Dhofari traditional herdsmen. Nonetheless, these traditional pastoralists own herds of camels, cattle, and goats. They have no sheep in their herds or as one of their animals.

The environmental conditions in this region have potential and limitations for all herdsmen and their animals. Therefore, the seasons and the natural resources necessitate and compel herdsmen to adopt transhumant seasonal movement. This mobility is usually between two marked locations and in response to the seasonal ecological conditions, the availability of pasture and the wellbeing of the herd. The movement take place every season between summer and winter in which the herdsmen move between sites in the rainy season others in the summer (cf. ElMahi 2011:38).

However, the environmental conditions in Dhofar are equally suitable for sheep as it is for the goats. Nonetheless, sheep population is limited when compared with the goat in the same region. In fact, there are no sheep herders in Dhofar. Sheep are only found in small numbers in the towns such as Salalah as the plates show (cf. Plate 1, 2 and 3). Therefore, there must be another factor that causes the limitation of sheep population in Dhofar region.

It is plain that the preference and choice of the herdsmen in Oman is for goats and not sheep. Apparently, the potential of goats is more beneficial for the herdsmen than the sheep in Oman. Goats are more relating to adaptation in Oman's ecological conditions and the movement pattern of the herdsmen. Moreover, it is common among the herdsmen that goats provide more milk when compared with sheep. Therefore, goats are the main source of milk and meat for herdsmen and their capital and means that maintains life.

According to Omani herdsmen, tending, and shepherding goats is much benefit from trouble-free and undemanding when compared with the sheep. No doubt, this has made the goats more propitious and favorable throughout the regions in Oman. Nonetheless, there is another factor that necessitate the preference and ownership of goats than sheep. The marked difference between goat and sheep populations can possibly be produced and set off by another factor than the preference of the herdsmen.

In Oman, it has come to light that copper levels in the soil can have an effect on animals. Therefore, copper concentration in the soil can possibly be an explanation for limited numbers of sheep Oman. If copper has a role or influence in the difference between sheep and goat populations, then it necessary to explore this geological element.

However, before proceeding with this attempt, it would be useful to interview the traditional herdsmen about this matter. The herdsmen confirmed that goats were their main animals as far as they can remember. They stress that goats were the animals of their fathers and grandfathers. Again, no one has ever heard of any of their tribes had a herd of sheep.

In fact, copper is and one of eight essential plant micronutrients, and is necessitated for several enzymatic actions in plants and for chlorophyll and seed production (cf. https://www.incitecpivotfertilisers.com.au/~/media/Files/IPF/

Documents/Fact%20Sheets/22%20Copper%20Fact%20Sheet.pdf).

Geologically, the Samail Ophiolite is a large slab of oceanic crust, made of volcanic rocks and ultramafic rocks from the Earth›s upper mantle, that was overthrust onto continental crust as an ophiolite. It had affected Hajar Mountains of Oman and the United Arab Emirates. This Ophiolite is rich in copper and chromite ore bodies that affected the ocean floor and the upper mantle on land (cf. Metcalf and Shervais (2008) and Schreurs and Millson (2013).

For this reason, it is evident that the soil in Oman is rich in copper. Furthermore, it has been ascertained that goats are more tolerant for copper than sheep (cf. Osman et al. 2003). Even so, the history of copper deficiency excess in grazing livestock in Oman has not been fully studies. All the same, copper can possibly be an explanation for the discrepancy in population numbers of the goat and sheep.

The clarification of the discrepancy in the numbers of both animals necessitates the examination of the archaeology records in Oman. Therefore, examining the evidence retrieved of goat and sheep from archaeological sites is needed.

Sheep and goats in prehistory

In Oman, asserted evidence of the domestic goat *Capra hircus* comes from the Early Bronze Age site RJ-2 of Ra's al-Jinz, which is dated to ca. 2300 BC (Cleuziou and Tosi 2000: 28,41,43; Bokonyi 1998:96-97). Evidence of goat was also retrieved from the Manal site in Wadi Samayil. The date of the Manal site is from the end of the second and the beginning of the first millennium BC (ElMahi and Ibrahim 2003). More documented evidence of goat was unearthed at Khor Ruri. New dates pushed the date of this city to the late first century BC (Bonacossi 2002:41-48).

Up to the present, archaeological investigations in Oman have discovered that goats exceeded sheep in numbers. The inquiries carried out by Bokonyi (1998:99) matched the specific-ratio of goat and sheep bone material retrieved from Ra's al-Jinz site (ca. 2300 BC). The result of this examination showed that goat bones are four times more than sheep. Subsequently, Bokonyi (ibid.) concluded that the difference between the bones of the two animals rests on the comparatively high goat milk when compared to the sheep. Thus, according to Bokonyi (ibid.) in prehistoric times high milk supply by goats made these animals more preferred and wanted than sheep. On the other hand, Salvagno and Albarella (2017) discussed the difficulty to point difference of the bones of both animals. Salvagno and Albarella (ibid.) pointed out the morphometric system to distinguish sheep and goat postcranial bones.

On the other hand, Phillips and Mosseri-Marlio (2002:204-206) examined the excavated sheep bones from Kalba site in Al Sharjah, UAE. At the same time, the minerals in the soil of the site were studied. The soil tests showed that copper in high levels and ranging between (28-83 ppm). Consequently, ElMahi (2011: 110) addressed this topic and stated the following:

'' The samples of retrieved sheep bones from levels dated to

millennium and the Iron Age gave high concentration of copper (12

ppm & 20 pp). Upon these results Phillips and Mosseri-Marlio *(ibid.)*

concluded that sheep in Kalba site must have been suffered from

actuate copper poising. In a personal communication, Carl Phillips

(Director of Kalba excavations) suggested that copper could possibly

be the reason for the small numbers of sheep in the areas of the Emirates and Oman''.

Today, the ratio of sheep to goat among all traditional societies in Oman is very much comparable to the bones ratios of both animals unearthed from archaeological sites.

For example, the Bedouins of Al-Shraga in eastern Oman have small and limited number of

sheep. This is the situation of sheep throughout the Omani regions.

In Oman, the discrepancy in the numbers of goats and sheep in the present and prehistoric times has been confirmed by the present-day statistics the recovered archaeological evidence. Accordingly, prehistoric herdsmen in Oman must had small numbers of sheep than goats. The greater number of goats' bones recovered from archaeological indicate that sheep populations were in small numbers. Subsequently, this is direct evidence that the copper in the soil must had infected and caused change and reduction in sheep populations during prehistoric times. This is the result and consequence of sheep grazing on pastures were copper in high levels and, hence poisoning these animals. As mentioned previously, Osman et al. (2003) stated that goats are more tolerant for copper than sheep.

CONCLUSION

Finally, it seems that the current difference of sheep and goats' population numbers in Oman must had been happing during prehistoric times. Geologically, all through time the high level of copper in the soil is a decisive factor. Therefore, when prehistoric herdsmen moved to the new region ''Dhofar'' circa 1000 BC. (cf. Zarins 2oo1: 154), they must had experienced and recognized that sheep cannot prosper as goats in this environment. Indeed, this is a reasonable analogy based on archaeological evidence and explains the position of sheep in the present and prehistoric times in Oman.

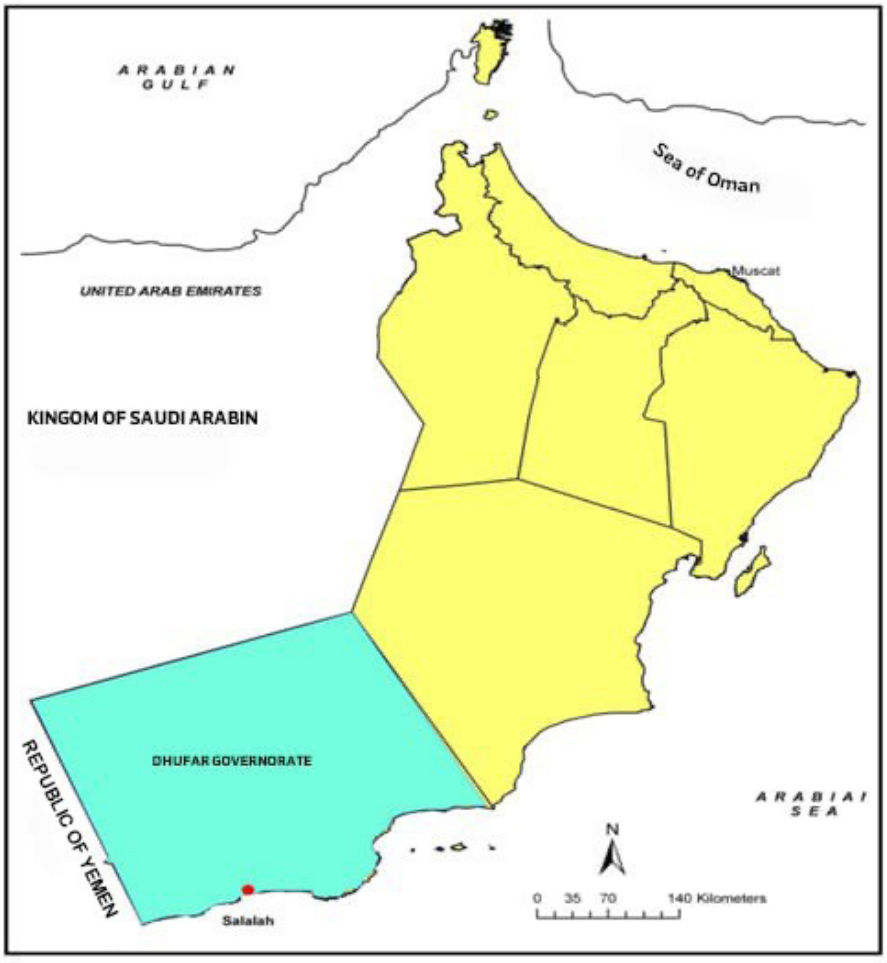

Figure 1*: Dhofar region, Sultanate of Oman.*

Figure 2*: Sheep in Salalah, Dhofar.*

Figure 3*: Sheep are scattered in Salalah town, Dhofar.*

Figure 4*: Sheep in Salalah, Dhofar.*

Figure 5*: Goats and herders in Dhofar.*

Figure 4*: Goats in Dhofar.*

Figure 5*: Goats in Dhofar, Oman*.

BIBLIOGRAPHY

Bokonyi, S. 1998. Animal husbandry, hunting and fishing in Ras Al- Junayz Areas. A basic of the human subsistence.

*Archaeozoology of the Near East III.*Ed. H. Buitenhuis, L. Bartosiewicz and A.M. Choyke. Publication 18, pp. 95-102. The Netherlands.(Nutrient Requirements of Domestic Animals Series 1981:6)

Bonacossi, D. M. 2002. Excavations at Khor Rori The 1997 and 1998 Campaigns. In Khor Rori Report 1 (ed.) Avanzini, A.,174 pp 29-52 Edizoni Plus Universita di Pisa.

Cleuziou, S. and Tosi, M. 2000 Ra's al-Jinz and the Prehistoric Coastal Culture of the Jalan. Journal of Oman Studies, vol 11, pp.19- 73. Sultanate of Oman.

Country Report on the State of Animal Genetic Resources (AnGR) In the Sultanate of Oman. (https://www.fao.org/3/a1250e/annexes/CountryReports/Oman_E.pdf)

Dahl, G. and Hjort, A. 1976. *Having Herds* Studies in Social anthropology 2. University of Stockholm.

ElMahi. A.T. and Ibrahim, M. 2003. Two seasons of investigations Manal site in the Wadi Samayil area, Sultanate of Oman. *Proceedings of the Seminar of Arabian Studies* 177 vol. 31, pp. 77-98 Archaeopress Oxford.

Haenlein, G.F.W. 2007. About the evolution of goat and sheep milk Production. *Small Ruminant Research* Volume 68, Issues 1–2, March 2007, P: 3-6

Meadow, R. H. 1971. The Emergence of Civilization. *Man, Culture and Society.* H. L. Shapiro (ed.) pp. 112-167. Oxford University Press Oxford.

Oman SoW Report 2020. Country Report on the State of Animal Genetic Resources (AnGR) In the Sultanate of Oman 2020. Oman SoW Report – Translation from the Original Arabic.

Osman, N.I.E.D., Johnson, E.H., Al-Busaidi, R.M. and Suttle, N.F. 2003. The effects of breed, neonatal age and pregnancy on the plasma copper status of goats in Oman. *Veterinary research Communications*. 27, pp 219-229. Kluwer Academic Publishers the Netherlands.

Phillips, C.S. and Mosseri-Marlio, C.E. 2002. Sustaining Change: The emergence picture of the Neolithic to Iron Age subsistence economy at Kalba, Sharjah Emirate, UAE. *Proceedings of the fifth international symposium on the archaeology of southwestern Asia and adjacent areas*. (eds.) H. Buitenhuis, A.M. Choyke, M. Mashkour and A.H. Al-Shiyab. ARC-Publicaties 62. pp 195- 209 Groningen, The Netherlands.

Metcalf, R.V. and Shervais, J. W. 2008. Suprasubduction-zone ophiolites: Is there really an ophiolite conundrum? (PDF). In Wright, J.E.; Shervais, J.W. (eds.). Ophiolites, Arcs, and Batholiths: A Tribute to Cliff Hopson. Geological Society of America, Special Paper. *Geological Society of America*. Vol. 438. pp. 191–222. doi:10.1130/2008.2438(07).

Salvagno, L. and Albarella, U. 2017. A morphometric system to distinguish sheep and goat postcranial bones. Published: June 8, 2017 (https://doi.org/10.1371/journal.pone.0178543 Schreurs, J. and Millson, J. 2013. *Ophiolites a natural wonder* (PDF). Retrieved 10 October 2013.

Swift, J. 1973. Disaster and Sahelian Nomad Economy. *Drought In Africa.* E. Dalby and E. Church (eds.).Center for African Studies. University of London. Zarins, J. 2001.*Dhofar the land of Incense.* (Eds.) M. Ibrahim, A.T. ElMahi and J. Own.

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