Turkish Journal of Zoology

Volume 32 | Number 1 Article 9

1-1-2008

Diet Composition of the Pharaoh Eagle Owl, Bubo ascalaphus, in Azraq Nature Reserve, Jordan

ADWAN HUSSIEN SHEHAB

MICHAL CIACH

Turk J Zool
32 (2008) 65-69

Diet Composition of the Pharaoh Eagle Owl, *Bubo ascalaphus*, in Azraq Nature Reserve, Jordan

Adwan H. SHEHAB[1,*], Michal CIACH[2]

[1]General Commission for Scientific Agricultural Research (GCSAR) Douma P.O. Box 113, Damascus, SYRIA

[2]Department of Forest Zoology and Wildlife Management, Agricultural University of Kraków, Faculty of Forestry, al. 29 Listopada 46 31 – 425 Kraków, POLAND

Received: 07.11.2006

Abstract: Pellets of the Pharaoh Eagle Owl *Bubo ascalaphus* were collected from Azraq Nature Reserve in the Eastern Desert of Jordan. Analysis of the content of the owl pellets yielded the remains of 107 individuals of prey representing 15 different species. Based on the numbers of individual prey items, 13.1% was represented by 3 insectivores (*Hemiechinus* aff. *auritus*, *Crocidura suaveolens,* and *Suncus etruscus*) and 73.8% by 4 rodents (*Mus* aff. *musculus*, *Meriones libycus, Gerbillus nanus,* and *Jaculus jaculus*). In total, mammals constituted 86.9% of the total number of prey items and 89.9% of the prey mass. We also identified 4 birds (*Passer domesticus, Luscinia* sp, *Sylvia* sp, one belonging to Alaudidae family), as well as 2 unidentified lizards, 1 snake, and 2 insects.

Key words: *Bubo ascalaphus*, Pharaoh Eagle Owl, Azraq, Jordan, pellets, small mammals

Introduction

Previous studies that discussed the food composition of the Eagle Owls in Jordan and its neighbouring countries were mainly concerned with the distribution and abundance of the prey items, particularly mammal species. Amr et al. (1997) investigated the pellets collected from Al-Nakheel area in Azraq Nature Reserve and concluded that the Eagle Owl is an agile hunter that feeds mainly on *Mus musculus* and *Crocidura suavulens*. Rifai et al. (2000) analysed the pellets collected from Faydat ad Dahikiyah and stated that the Desert Eagle Owl, *Bubo bubo ascalaphus,* is an opportunistic hunter that feeds on a wide range of animals including *Meriones crassus* and *Jaculus jaculus*. In Syria, Shehab (2004) reported that the Eagle Owl, *B. bubo,* fed mainly on *Hemiechinus auritus*, *Meriones tristrami,* and *Jaculus jaculus* in the Syrian Desert. The presence of Eagle Owl in Jordan was reported by Andrews (1995); but the researcher did not provide information about its subspecific status. In the present study, following König et al. (1999) and del Hoyo et al. (1999), we treat the Pharaoh Eagle Owl as a separate species occurring in the region.

This study reports on the food composition of the Eagle Owl in Azraq Nature Reserve on the basis of the frequency and biomass of the prey items. It also contributes to previous knowledge on the small mammals in this area.

Material and Methods

Pellets of the Pharaoh Eagle Owl were collected from under palm trees in the central part of Azraq Nature Reserve on 14 September 2003. Most of the pellets were intact and considered to be less than 1 year old. Remains of vertebrates and arthropods were removed from each pellet. Only cranial elements were used to quantify the number of the mammalian prey items and to identify their taxonomic status. Mammal remains were compared to a reference collection housed in the General Commission for Scientific Agricultural Research (Damascus-Syria). The avian remains were identified depending on the morphological characteristics of the skeleton fragments and skulls, where the minimum number of individuals (MNI) was estimated as described Bochenski et al. (1993). We estimated body mass for

* E-mail: a.shehab@mail.sy

insectivores according to Krystufek and Vohralik (2001), for rodents Abu Laban (1999), Langer (2002), and Abu Baker and Amr (2003a), and for birds Cramp (1988; 1992) and Cramp and Perrins (1994). Study material has been archived at the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences in Kraków, Poland.

Abbreviations: GtL = Greatest length of skull; IC = Interorbital constriction; NL = Nasal length; Dia = Diastema; ForI = Foramen incisivum; MXC = Maxillary cheek teeth, (gs = grinding surface) measured at the top of the cheek teeth row (ab = at base) measured at base of the cheek teeth row; MDC = Mandibular cheek teeth; M = Mandible length (incisor included); MB = Mandible body (incisor not included); ZI = Zygomatic index (width of anterior part of the malar process/width of anterolateral part of the zygomatic arch, used only for *Mus*).

Results

Remains of 107 individuals representing 15 different species belonging to 4 classes were recovered from owl pellets. By frequency; rodents constituted 73.8%, insectivores 13.1%, birds 7.5%, reptiles 2.8% and insects 2.8% of the prey items. With respect to the total weight of prey, rodents constituted 78.4%, insectivores 11.5%, birds 7.6%, reptiles 2.4%, and insects 0.2% of the biomass (Table).

Order Insectivora

Family Erinaceidae

Long-eared Hedgehog, *Hemiechinus* aff. *auritus* (Gmelin, 1770)

Measurements (n= 1): P^4-M^3 = 10.70, M= 32.68, MB= 31.42, I_1-M_3= 18.82.

A fractured skull and 2 left jaws (1 diagnostic of a juvenile) were recovered. The available measurements were close to those of the Long-eared Hedgehog as

Table. Diet composition of the Pharaoh Eagle Owl, *Bubo ascalaphus,* in Azraq Nature Reserve, Jordan.

Taxa	Species	n	n %	Body mass (g)	Biomass (g)	Biomass %
Rodentia	*Mus musculus*	61	57.0	20.5	1250.5	37.5
	Gerbillus nanus	8	7.5	22.0	176	5.3
	Meriones libycus	9	8.4	125.0	1125	33.8
	Jaculus jaculus	1	0.9	60.0	60	1.8
Insectivora	*Hemiechinus auritus*	2	1.9	173.8	347.6	10.4
	Crocidura suaveolens	2	1.9	8.6	17.2	0.5
	Suncus etruscus	10	9.3	1.9	19	0.6
Aves	Alaudidae indet.	1	0.9	60.0	60	1.8
	Luscinia sp.	1	0.9	25.0	25	0.8
	Sylvia sp.	1	0.9	15.0	15	0.5
	Passer domesticus	5	4.7	30.0	150	4.5
Reptilia	Lizards	2	1.9	15.0	30	0.9
	Serpents	1	0.9	50.0	50	1.5
Insecta	Beetles	3	2.8	2.0	6	0.2
	Total	107	100		3331.3	100

reported by Shehab (2004). Harrison and Bates (1991) gave a range of 18.8 - 21.8 mm (20.2 mm ± 0.9) for the length of the lower teeth row of this species. On the basis of frequency, this hedgehog constituted 1.9% of the prey numbers and 10.4% of the total prey mass.

Family Soricidae

Lesser white-toothed shrew, *Crocidura suaveolens* (Pallas, 1811)

Material: (2 left mandibles + 1 right mandible + fractures of 1 maxilla).

Measurements: M= 11.12-11.20 (2), MB= 9.54-9.64 (2), I_1-M_3= 7.12-7.22 (2).

Remains of 2 skulls of *C. suaveolens,* constituting 1.9% of the total prey items, were recovered.

Savi's pygmy shrew, *Suncus etruscus* Savi, 1822

Material: (10 left mandible + 10 right mandible + fractures of 6 maxilla).

Measurements: IC = 2.68-2.86 (2.78 ± 0.08) (4), I^1-M^3 = 4.94-5.30 (5.19 ± 0.13) (6), M = 7.06-8.34 (7.71 ± 0.37) (8), MB = 6.22-6.54 (6.33 ± 0.12) (8), I_1-M_3 = 4.38-5.06 (4.81 ± 0.24) (8).

The available cranial measurements agree with those reported by Harrison and Bates (1991) for Savi's pygmy shrew. This shrew, which inhabits semi-arid and moist habitats in Arabia, has not previously been found in the pellets of the Pharaoh Eagle Owl in Jordan. Savi's pygmy shrew constituted 9.3% of the total number of prey, while it constituted 0.6% of the total mass of the prey items.

Order Rodentia

Family Muridae

House mouse, *Mus* aff. *musculus* Linnaeus, 1758.

Material: (61 left mandibles + 60 right mandibles + 27 posteriorly damaged maxillas).

Measurements: Dia = 5.4-6.18 (5.68 ± 0.32) (5), ForI = 4.32-5.14 (4.81 ± 0.33) (5), MXC = 3.44-3.68 (3.56 ± 0.09) (5) gs / 3.0-3.64 (3.30 ± 0.21) (6) ab, MDC = 2.92-3.34 (3.16 ± 0.13) (9) ab, M = 12.42-14.0 (12.87 ± 0.47) (10), MB = 10.54-13.8 (11.85 ± 0.81) (10), ZI = 0.48-0.62 (0.54 ± 0.04) (10).

The remains of 61 individuals were recovered. Tooth structure, shape of the malar process and measurements were very close to those reported by Harrison and Bates (1991) for *Mus musculus*. To confirm the identification of the available cranial remains, we used the zygomatic indexes (ZI) described in Gözcelioğlu et al. (2005). The ZI of *Mus* from Azraq N. R. (0.54 ± 0.04) was larger than the that of *Mus domesticus* (0.30 - 0.38) and smaller than that of *Mus macedonicus* (0.63 - 0.66) collected from Turkey. Also, Harrison and Bates (1991) illustrated that the malar process of *M. musculus* is narrower than that of *M. macedonicus* as compared to the width of the upper part of the zygomatic arch. With respect to the frequency (57.0%) and biomass (37.5%), the house mouse found to be the most important component of the owl's diet. (Table)

Family Dipodidae

Lesser jerboa, *Jaculus jaculus* (Linnaeus, 1758)

Material: (1 left mandible + 1 right Mandible + posteriorly damaged maxilla).

Measurements (n = 1): IC = 11.08, NL = 10.00, Dia = 8.44, ForI = 4.06, MXC = 5.58 ab, MDC = 6.00 ab, MB = 15.44.

Remains of 1 skull of *J. jaculus,* constituted 0.9% of the total number of prey items, were recovered. The available measurements agree with those mentioned by Harrison and Bates (1991) for the medium sized subspecies, *J. j. vocator*. The large length of the interorbital constriction of the maxilla is a unique feature that distinguishes the cranial remains of this species from those of the 5-toed Jerboa in Jordan.

Family Cricetidae

Subfamily Gerbillinae:

Libyan jird, *Meriones libycus* Lichtenstein, 1823

Material: (9 left mandibles + 9 right mandibles + 2 damaged maxillas).

Measurements: GtL = 43.68 ± 0 (1), ForI = 7.35 ± 0.89 (2), IC = 7.1 ± 0.23 (2), Dia = 10.38 ± 0.79 (2), MXC = 7.04 ± 0 (1) ab, MDC = 6.91 ± 0.34 (3) ab, MB = 22.33 ± 1.26 (3).

Remains of 9 skulls belonging to the genus *Meriones* were found. The cranial characters and measurements are close to those given by Harrison and Bates (1991) and Abu Laban (1999) for *M. libycus,* which is very common in Azraq Nature Reserve. *M. libycus* is mainly diurnal and thus its remains in the pellets are unlikely to reflect its actual abundance, but may suggest that it was

taken during its unusual nocturnal activity or during unusual diurnal activity by the Pharaoh Eagle Owl. The Libyan jird represented 33.8% of food requirements of the owl.

Baluchistan Gerbil, *Gerbillus nanus* Blandford, 1875

Material: (8 left mandible + 8 right mandible + 8 damaged maxilla)

Measurements: IC = 4.82-5.12 (4.97 ± 0.15) (3), Dia = 6.62-7.26 (7.04 ± 0.51) (3), Forl = 4.74-5.0 (4.9 ± 0.14) (3), MXC = 3.52 ± 0 (1) gs, 4.22±0 (1) ab, MDC = 4.00 ± 0 (1) ab, M = 15.72 ± 0 (1), MB = 12.76-14.32 (13.67 ± 0.44) (8).

Remains of 8 skulls of *G. nanus* were found. The available measurements agreed with those given by Harrison and Bates (1991). Additionally, the structures of the upper and lower teeth are very similar to those illustrated by Abu Laban (1999) and Abu Baker and Amr (2003a) for the specimens collected from Azraq N. R. and other localities in the Eastern Desert of Jordan. This species has not been found in pellets of the Eagle Owl in Jordan before. This gerbil constituted 7.5% of the prey items and 5.3% of the biomass.

Aves

Remains of 8 avian individuals belonging to 4 different families were found (Alaudidae, Turdidae, Sylviidae, and Passeridae). The individual belonging to the family Alaudidae is probably *Melanocorypha* sp.; however, exact identification was not possible and other genera could not be excluded. The genus *Luscinia* is represented in Jordan by 3 species; *L. luscinia*, *L. megarhynchos*, and *L. svecica*. However, sizes of skull and bill remains indicate that it was a nightingale or a thrush nightingale. The genus *Sylvia* is represented by 11 species; *S. borin*, *S. curruca*, *S. communis*, *S. nisoria*, *S. nana*, *S. mystacea*, *S. conspicillata*, *S. hortensis*, *S. melanocephala, S. cantillans,* and *S. rueppelli* (Disi and Bouran, 1987); and most of these were recorded from Azraq Oasis (Nelson, 1973). Bill remains indicate that the bird was in a size of a whitethroat, although other similar-size species could not be excluded. The avian remains constituted 7.4% by frequency and 7.6% by biomass in the diet.

Reptilia

Remains of 3 reptiles, representing 1 unidentified snake and 2 unidentified lizards constituting 2.8% of the total number of the consumed prey were recovered. This percentage suggests that the Pharaoh Eagle Owl consumed reptiles as chance food.

Insecta

Remains of 3 insects representing 2 different species of beetles were recovered. The intact remains of chitin exoskeletons suggest that the Pharaoh Eagle Owl consumes insect preys directly, where sometimes the insect remains represent indirect food of owls, when they feed on insectivores.

Discussion

Previous studies on the diet of the Eagle Owl have focused on determining the prey frequency, while no previous data have been published on the biomass of the consumed prey.

The Pharaoh Eagle Owl in Azraq N. R. feeds on a wide range of available prey species and depends mainly on mammals to ensure its food requirements, where the house mouse and the Libyan jird made up 37.5% and 33.8% of the total biomass of prey items, respectively, while by frequency, they constituted 57.0% and 8.4% of the total number of preys, respectively. On the other hand, Savi's pygmy shrew constituted 9.3% of the total number of prey, while it constituted only 0.6% of the total weight of the prey, suggesting that this species is a neglected component of the owl's diet in spite of its high frequency.

Compared to a previous study on the diet of the eagle owl conducted by Amr et al. (1997) in the same study area, our results indicate obvious differences in the mammalian prey taken. This does not necessarily reflect changes in the behavior of the owls, but may instead suggest changes in the habitat in the Azraq area. For instance, the frequency of the house mouse increased from 33.2% (Amr et al. 1997) to 57% (the present study), probably due to increased urbanizations in Azraq area. Also, *J. jaculus* was rare in our material, 0.9%, while it was found 6.5% by Amr et al. (1997) and 17% by Rifai et al. (2000). The Baluchistan gerbil has not been found in the pellets of the eagle owl in Azraq area before, although Abu Laban (1999) and Abu Baker and Amr (2003a) mentioned that this species is very common.

These findings agree with Amr et al. (1997) that the drastic changes that have occurred in Azraq area, such as drying up of most pools due to extensive water pumping, have had a major impact in reducing the populations of shrews and other rodents.

Acknowledgment

We would like to thank Dr. Teresa Tomek for the identification of the avian remains. Many thanks are extended to Prof. Dr. Zuhair S. Amr for his valuable comments on the manuscript, to Dr. Steven Rosseter for linguistic revision, and to Mr. Mohammed Abu Baker for his kind help on the identification of Gerbil. Michal Ciach wishes to thank Khaldoun Al-Omari, Ahmed Zo'ubi, and Anwar Elhalah from RSCN for their hospitality during his residence in Jordan. This study was made possible by co-operation within the SE European Bird Migration Network (SEEN).

References

Abu Baker, M. and Amr, Z. 2003a. A morphometric and taxonomic revision of the genus *Gerbillus* (Mammalia, Rodentia, Gerbillidae) in Jordan with notes on its current distribution. Zoologische Abhandlungen 53: 177-204.

Abu Baker, M. and Amr, Z. 2003b. Rodent diversity in the Northeastern desert of Jordan, with special reference on the ecology of *Gerbillus cheesmani* (Mammalia: Rodentia). J. Nat. Mus., Nat. Hist. Ser. 172: 141-152.

Abu Laban, N. 1999. The Ecology of Some Rodents in Azraq Wetland Reserve, with a Special Reference to Some Abundant Species. M. Sc. Thesis, Faculty of Graduate Studies, University of Jordan. 182 pp.

Amr, Z. S. 2000. Jordan Country Study on Biological Diversity: Mammals of Jordan. United Nations Environment Programme, Amman: 1-100.

Amr, Z. S., Abu Baker, M. and Rifai, L. 2004. Mammals of Jordan. Denisia 14: 437-465.

Amr, Z. S., Al-Melhim, W. and Yousef, M. A. 1997. Mammal remains from pellets of the Eagle Owl, *Bubo bubo*, from Azraq Nature Reserve, Jordan. Zoology in the Middle East 14: 5-10.

Andrews, I. J. 1995. The Birds of the Hashemite Kingdom of Jordan. Musselburgh. 185 pp.

Atallah, S.I. 1977. Mammals of the Eastern Mediterranean region, their ecology, systematics and zoogeographical relationships. Säugetierkundliche Mitteilungen 25: 241-320.

Bates, P. J. J. and Harrison, D. L. 1989. New records of small mammals from Jordan. Bonner zoologische Beiträge 40: 223-226.

Bochenski, Z. M., Tomek, T., Boev, Z. and Mitev, I. 1993. Patterns of bird bone fragmentation in pellets of the Tawny Owl (*Strix alluco*) and the Eagle Owl (*Bubo bubo*) and their taphonomic implications. Acta zoologica cracoviensia 36: 313-328.

Cramp, S. (Ed.). 1988. The Birds of the Western Palearctic. Vol. V. Oxford University Press, Oxford.

Cramp, S. (Ed.). 1992. The Birds of the Western Palearctic. Vol. VI. Oxford University Press, Oxford.

Cramp, S. and Perrins, C. M. (Eds.). 1994. The Birds of the Western Palearctic. Vol. VIII. Oxford University Press, Oxford.

del Hoyo, J., Elliott, A. and Sargatal, J. (Eds.). 1999. Handbook of the Birds of the World. Vol. 5. Barn-owls to Hummingbirds. Lynx Edicions, Barcelona.

Disi, A. M. and Bouran, A. H. 1987. A Check-list of The Birds of The Hashemite Kingdom of Jordan. University of Jordan, Amman. 132 pp.

Gözcelioğlu, B., Çolak, R., Çolak, E. and Yiğit, N. 2005. A Study on *Mus domesticus* Rutty, 1772 and *Mus macedonicus* Petrov and Ruzíc, 1983 (Mammalia: Rodentia) distributed along the line of Ankara, Bolu and Zonguldak. Turk. J. Zool., 29, 133-140.

Harrison, D. L. and Bates, P. J. J. 1991. The Mammals of Arabia. Sevenoaks (Kent). 354 pp.

König, C., Weick, F. and Becking, J-H. 1999. Owls: A Guide to the Owls of the World. Pica Press. Sussex.

Krystufek, B. and Vohralík, V. 2001. Mammals of Turkey and Cyprus Introduction. Checklist, Insectivora. Koper. 140 pp.

Langer, P. 2002. The digestive tract and life history of small mammals. Mammal Rev. 32, 2: 107-131.

Nelson, B. 1973. Azraq Desert Oasis. Allen Lane, London. 436 pp.

Qumsiyeh, M. B. 1996. Mammals of the Holy Land. Texas Tech University Press. 389 pp.

Rifai, L. B., Al-Melhim, W. N., Gharaibeh, B. M. and Amr, Z. S. 2000. The diet of the Desert Eagle Owl, *Bubo bubo ascalaphus*, in the Eastern Desert of Jordan. Journal of Arid Environments 44: 369-372.

Shehab, A. H. 2004. Diet of the Eagle Owl, *Bubo bubo*, in Syria. Zoology in the Middle East. 33: 21-26.