

Food of the Barn Owl *Tyto alba* in the Yahmool Area, Northern Syria

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Abstract: Pellets regurgitated by the barn owl (*Tyto alba*) were collected in July 2000 from Yahmool Agricultural research station, 50 km north of Aleppo. Pellet analysis yielded 657 individual prey representing 7 species of rodents, 2 shrews, 1 bird, an unidentified lizard and at least 7 species of insects. By frequency, rodents constituted 84.9% of the prey items, shrews 9.6%, birds 1.5%, insects 3.7% and lizards 0.3%. The social vole, *Microtus socialis*, was the main food of the barn owl, constituting 59.5% of prey items. Pellets' content indicated that the barn owl consumes 1 to 5 prey per day (average 2.53 ± 1.03) depending on availability and the size of prey species.

Key Words: Barn owl, Pellets, rodents, small mammals, Syria, *Tyto alba*

Introduction

Owls' pellets from different parts of Syria were subjected to extensive studies. Pradel (1981) investigated remains of the gray hamster *Cricetulus migratorius* from owls' pellets collected from the ruins of Krak des Chevaliers, 60 km west of Homs. Other studies examined remains of small mammals regurgitated from different owl species (Kock and Nader, 1983; Kock et al., 1994; Kock, 1998; Shehab et al., 1999, 2004; Hutterer and Kock, 2002).

Within the course of studying the dormice in the Middle East, Obuch (2001) found a total of 3012 individual prey in owls' pellets collected from 7 locations in Syria.

Shehab et al. (2000) studied the role of owls as natural enemies against agricultural pests in Syria. The diet of the barn owl *Tyto alba*, which is considered an ideal owl species to be used to study the distribution and age structure for population of small vertebrates (Ruprecht, 1979) has been studied in 3 locations in southern Syria (Shehab, 2005).

The purpose of this study was to determine the diet of the barn owl in northern Syria and to assess their importance as natural enemies against agricultural pests.

Materials and Methods

Sixty intact pellets and many fragmented pellets of the barn owl *Tyto alba* accumulated under Italian cypress trees (*Cupressus sempervirens*) were collected on 03.07.2000 from Yahmool Agricultural Research Station near the Syrian-Turkish border (36° 33' N – 37° 06' E), 3 km east of Azaz.

Skulls, maxillas and mandibles were removed and kept in labeled containers. The remains were identified based on Harrison and Bates (1991) and reference skulls prepared from live specimens collected from Syria as comparative material. The material of this study is deposited in the collection of the Animal Pest Division, General Commission for Scientific Agricultural Research (GCSAR) Damascus, Syria.

Abbreviations: (for rodent) GtL= Greatest length of skull; CbL = Condylbasal length; ZB= Zygomatic breadth; IC= Interorbital constriction; NL= Nasal length; Dia= Diastema; ForI= Foramen incisivum; MXC= Maxillary cheekteeth; MDC= Mandibular cheekteeth; M= Mandible length (incisor included); MB= Mandible body (incisor not included); TB= Tympanic Bulla (length); N= Number of specimens.

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Results and Discussion

A total of 657 prey items were recovered from the examined material. Small mammals were the main food of the barn owl, constituting 94.5% of the total number of prey items. The number of prey per pellet ranged from 1 to 5 (average 2.53 ± 1.03).

Most pellets contained cranial bones only, without the rest of the skeletal remains; this may be due to the owls' behavior in eating the heads of rodents only, particularly when the latter are very abundant, as mentioned by Raczynski and Ruprecht (1974).

Order Rodentia

Seven rodent species belonging to 3 families (Muridae: *Mus musculus*, *Rattus norvegicus*; Cricetidae: *Cricetulus migratorius*, *Mesocricetus auratus*, *Microtus socialis*, *Meriones tristrami*; Spalacidae: *Spalax leucodon*) were identified. Table 1 shows the cranial and dental measurements of the rodent species.

The House Mouse: *Mus musculus* LINNAEUS, 1758

The house mouse constituted 10.5% of the prey items (Figure). The number of skulls per pellet was 0-3. In southern Syria the house mouse was the predominant prey species in all locations: 32% for Al-Mozirieb, 27.6% for Khrab Al-Shaham and 63.1% for Kharabow (Shehab, 2005). The percentage of *M. musculus* is

usually higher in the diet of the barn owls nesting beside urban areas (Ruprecht, 1979), whereas it is low in pellets collected from rural areas (Rifai et al., 1998). Yahmool Agricultural Research Station is located in a rural area.

The Norway Rat: *Rattus norvegicus* (BERKENHOUT, 1769)

The presence of this commensal rodent as a chance food in the pellets (0.5%) suggests that owls do not extend their hunting territory and rarely visit inhabited areas when food is available near the nesting sites in nature. In comparison with Harrison and Bates (1991), measurements of the recent cranial remains of this species indicated that they were subadults.

The Gray Hamster: *Cricetulus migratorius* (PALLAS, 1773)

The gray hamster constituted 3.65% of the diet. This species was studied from pellets of the barn owl collected from the Krak des Chevaliers in central Syria (Pradel, 1981). It has also been recorded from Ebla, northern Syria (Shehab et al., 1999) and from southern Syria (Shehab, 2005). The distinguishing feature that helps in predicting the presence of hamsters in owls' pellets from the first look is the presence of seeds of different species (wheat, barley, sunflower, lentil, oat) on the pellet's surface. This may imply that the barn owl attacks the gray hamsters while the latter are feeding, when their

Table 1. Cranial and dental measurements (mm) for rodent species recovered from pellets of the barn owl *Tyto alba*. Yahmool's Agri. Res. Station, [Average \pm sd (n)].

	<i>Microtus socialis</i> N = 391	<i>Mus musculus</i> N = 69	<i>Rattus norvegicus</i> N = 3	<i>Mesocricetus auratus</i> N = 67	<i>Cricetulus migratorius</i> N = 24	<i>Meriones tristrami</i> N = 3	<i>Spalax leucodon</i> N = 1
CtL	26.99 \pm 0.54 (10)	-	-	33.33 \pm 2.33 (7)	-	-	36.62 \pm 0.0 (1)
CbL	-	-	-	-	-	-	33.82 \pm 0.0 (1)
ZB	15.09 \pm 0.37.(10)	11.17 \pm 0.24.(2)	-	18.01 \pm 0.94.(10)	-	19.0 \pm 0.79.(2)	24.44 \pm 0.0 (1)
IC	3.76 \pm 0.12.(10)	3.56 \pm 0.09.(10)	5.68 \pm 0.06 (2)	4.73 \pm 0.12.(10)	3.88 \pm 0.15.(5)	6.09 \pm 0.52.(2)	5.98 \pm 0.0 (1)
NL	7.43 \pm 0.26.(10)	7.86 \pm 0.53.(10)	-	14.38 \pm 0.84.(10)	9.44 \pm 0.20.(2)	-	15.44 \pm 0.0 (1)
TB	10.49 \pm 0.28.(10)	-	-	7.65 \pm 0.68.(7)	-	-	9.90 \pm 0.0 (1)
Dia	7.55 \pm 0.25.(10)	5.67 \pm 0.33.(10)	9.28 \pm 0.0 (1)	9.93 \pm 0.84.(10)	6.99 \pm 0.24.(6)	9.16 \pm 0.85.(2)	10.76 \pm 0.0 (1)
ForI	4.13 \pm 0.18.(10)	5.19 \pm 0.34.(10)	5.71 \pm 0.27 (2)	5.10 \pm 0.18.(10)	4.63 \pm 0.30.(6)	6.27 \pm 0.24.(2)	3.00 \pm 0.0 (1)
MXC	5.75 \pm 0.27.(10)	3.20 \pm 0.12.(10)	6.76 \pm 0.0 (1)	5.74 \pm 0.18.(10)	3.55 \pm 0.02.(7)	5.1 \pm 0.0.(1)	5.90 \pm 0.0 (1)
MDC	5.54 \pm 0.18.(10)	2.99 \pm 0.12.(10)	6.54 \pm 0.0 (1)	5.80 \pm 0.19.(10)	3.64 \pm 0.07.(11)	5.0 \pm 0.0.(1)	-
MB	15.97 \pm 0.58.(10)	11.96 \pm 0.64.(10)	20.27 \pm 0.04 (2)	19.70 \pm 2.02.(46)	14.72 \pm 0.49.(11)	19.37 \pm 0.89.(2)	22.14 \pm 0.0 (1)
M	17.54 \pm 0.64.(10)	13.18 \pm 0.64.(10)	22.0 \pm 1.41 (2)	21.37 \pm 2.33.(46)	16.24 \pm 0.53.(11)	21.15 \pm 1.20.(2)	25.36 \pm 0.0 (1)

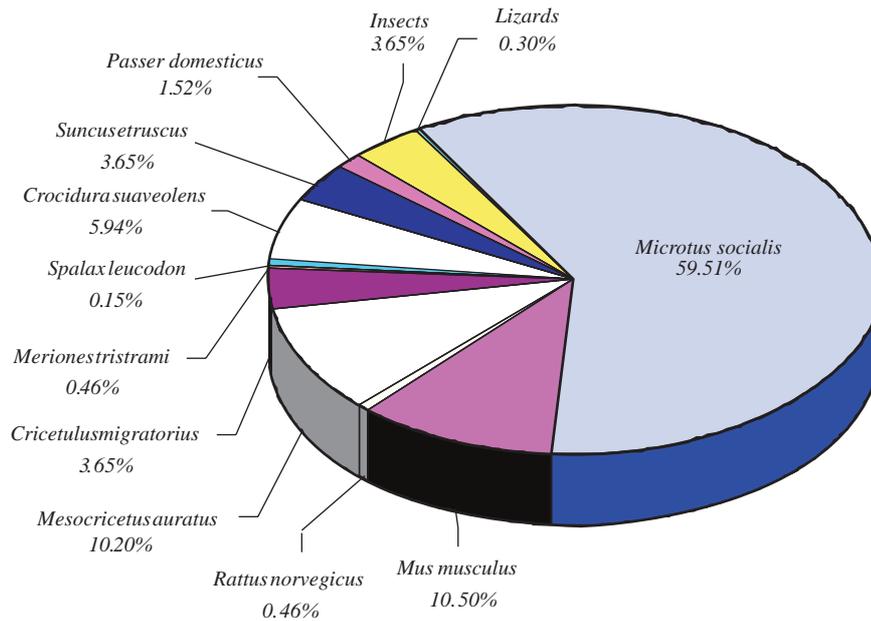


Figure. Percentage of prey species found in the barn owl's pellets in Yahmool, northern Syria.

cheek pouches are filled with seeds (Shehab et al., 1999, 2005).

obtained in many agricultural areas in Syria (Shehab et al., 1999, 2000; Shehab, 2005).

The Syrian Golden Hamster: *Mesocricetus auratus* (WATERHOUSE, 1839)

Remains of 67 individual of the Syrian golden hamster constituting 10.2% of the diet were recovered. This suggests that this species is still common in its type locality (around the city of Aleppo). Cranial and dental measurements are slightly larger than those given by Harrison and Bates (1991) and Shehab et al. (1999) for *M. auratus* from Ebla ruins, 70 km south of Aleppo. It is worth pointing out that 7 skulls only out of 67 were intact; this corresponds with Bochenski et al. (1993) that owls kill their prey by hitting them on the back of the head with their beaks.

The Social Vole: *Microtus socialis* (PALLAS, 1773)

The social vole was the main food of the barn owl in the Yahmool area. It constituted 59.5% of the total number of prey items (Figure). Remains ranging from 1 to 4 voles per pellet were found, indicating that the voles are the most abundant species within the hunting territory of the barn owl in and around Yahmool Agricultural Research Station. Similar results were

Tristram's Jird: *Meriones tristrami* THOMAS, 1892

Remains of 3 individual of *M. tristrami* constituting 0.5% of the diet were found. The percentage of this species was higher in the diet of the barn owl in 2 locations in southern Syria, constituting 7% and 22.4% at Al-Mozirieb and Khrab Al-Shaham respectively, whereas it was absent from the material of Kharabow (Shehab, 2005). Tristram's jird was found to be the predominant prey for the barn owl in northern Jordan, constituting 60.3% of its diet (Rifai et al., 1998).

The Mole Rat: *Spalax leucodon* NORDMANN, 1840

Mole rats have adapted largely to subterranean life, and rarely appear above the soil's surface, where they become prey for owls (Harrison and Bates, 1991; Qumsiyeh, 1996). A single skull of a subadult was found in the material.

Order Insectivora

Remains of 63 individuals of the order Insectivora belonging to the family Soricidae were recovered. Table 2

Table 2. Cranial and dental measurements (mm) for insectivores recovered from pellets of the barn owl *Tyto alba*. Yahmool's Agri. Res. Station, [Range + Average \pm sd (n)].

	<i>Crocidura suaveolens</i> N = 39	<i>Suncus etruscus</i> N = 24
Condolo-incisive length	18.88-19.32 (19.16 \pm 0.21) (4)	
Palatal length	6.68-8 (7.43 \pm 0.34) (10)	3.9-4.8 (4.47 \pm 0.30) (10)
Upper tooth row length	7.46-8.36 (8.07 \pm 0.28)(9)	4.46-5.4 (5.18 \pm 0.29) (10)
Maxillary breadth	5.24-6.82 (5.99 \pm 0.42) (9)	3.62-3.9 (3.82 \pm 0.09) (10)
Interorbital width	3.96-4.46 (4.16 \pm 0.15) (10)	2.8-3 (2.88 \pm 0.07) (9)
Greatest width	8.42-9.12 (8.78 \pm 0.23) (6)	5.3-5.3 (5.3 \pm 0.0) (1)
Postglenoid width	5.76-6.6 (6.26 \pm 0.27) (10)	3.5-4.14 (3.92 \pm 0.36) (3)
Lower tooth row	7.58-8.24 (8.02 \pm 0.21) (10)	4.82-5.16 (4.99 \pm 0.14) (10)
Coronoid height	4.58-5.1 (4.8 \pm 0.017) (10)	2.76-3.02 (2.93 \pm 0.09) (10)
Mandible	11.92-12.88 (12.36 \pm 0.33) (10)	7.46-8.32 (8.07 \pm 0.28) (10)
Mandible body	10-10.96 (10.22 \pm 0.31)(10)	6.28-6.84 (6.64 \pm 0.19) (10)

shows measurements for 2 species of shrews recovered from the recent material.

The Lesser White-toothed Shrew: *Crocidura suaveolens* (PALLAS, 1811)

The measurements of *C. suaveolens* (Table 2) are close to those mentioned by Harrison and Bates (1991) and to those given by Amr et al. (1997). The mandibles, lower and upper tooth rows of the Jordanian specimens seem to have been measured without the incisive. Hutterer and Kock (2002) reviewed measurements of different species of *Crocidura* from Syria and neighboring countries.

The frequency of this species (5.94%) in owls' pellets is mainly related to the abundance of this shrew in the hunting territory. Rifai et al. (1998) found that *C. suaveolens* constituted 3.1% of the diet of the barn owl in northern Jordan; Amr et al. (1997) found that this species constitutes 33.2% of the diet of the eagle owl in Azraq Natural Reserve. The remains of the lesser white-toothed shrew in the pellets of the barn owl in southern Syria constituted 7% of the material of Al-Mozirieb and 6.3% of those from Kharabow, while no shrews were found in the material of Khrab Al-Shaham, which is considered less suitable for shrews than the other locations (Shehab, 2005).

Savi's Pygmy Shrew: *Suncus etruscus* SAVI, 1822

Remains of Savi's pygmy shrew recovered from the material (3.65%) were less than those of the lesser white-toothed shrew (5.9%). The cranial and dental measurements of this species (Table 2) are very close to those mentioned by Harrison and Bates (1991). Several authors have mentioned the recovery of *S. etruscus* from owls' pellets collected from Syria. Nadachowski et al. (1990) recovered remains from Krak des Chevaliers. Kock and Nader (1983) recorded them from Mhardeh, 25 km NW of Hamah. Kock et al. (1994) trapped specimens from Tell sheikh Hamad, on the east bank of the Khabur River. Hutterer and Kock (2002) reviewed the distribution of this shrew in Syria and concluded that its distribution in Syria is limited to the Mediterranean area and around the banks of permanent rivers, except in Jebel Abd al-Aziz.

Birds

Remains of 10 individuals of the house sparrow, *Passer domesticus*, were recovered, constituting 1.5% of prey items. Higher rates (5.2%-6.9%) were reported for the house sparrow in the diet of the barn owl in southern Syria (Shehab, 2005). Ruprecht (1979) mentioned that the sociability of the sparrows and their noisy behavior were additional factors that made it easier for owls to catch them.

Lizards

Mandibles of 3 individuals representing lizards constituting 0.3% were recovered.

Arthropods

Seven species of insects were found; 3 were identified to their specific species, the Moroccan's locust (*Doclostaurus maroccanus*), the mole cricket (*Gryllotalpa gryllotalpa*) and the seven-spotted lady beetle (*Coccinella septempunctata*), while 4 unidentified species of beetles were found. The presence of beetles inside the pellets may be due to indirect consumption, since rodents,

especially hamsters, may stuff their cheek pouches with some insects while foraging before tearing them down. Rifai et al. (1998) compared the diet of the barn owl, *Tyto alba*, from different parts of the Middle East, and reported that Arthropods constitute less than 2.5% of the total number of prey items (results of 5 papers out of the 8).

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References

- 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.
- Bochenski, Z.M., Tomek, T., Boev, Z. and Mitev, I. 1993. Patterns of bird bone fragmentation in pellets of the Tawny Owl (*Strix aluco*) and the Eagle Owl (*Bubo bubo*) and their taphonomic implications. *Acta zoologica cracoviensia* 36: 313-328.
- Harrison, D.L. and Bates, P. J.J. 1991. *The Mammals of Arabia. Sevenoaks (Kent)*, 354 pp.
- Hutterer, R. and Kock, D. 2002. Recent and ancient records of shrews from Syria, with notes on *Crocidura katinka* Bate, 1937 (Mammalia: Soricidae). *Bonner zoologische Beiträge* 50: 249-258.
- Kock, D. and Nader I.A. 1983. Pygmy shrew and rodents from the Near East (Mammalia: Soricidae, Rodentia). *Senckenbergiana biologica* 64: 13-23.
- Kock, D. 1998. The gerbils and jirds of Syria (Mammalia: Rodentia: Muridae: Gerbillinae). *Senckenbergiana biologica* 77: 117-122.
- Kock, D., Krupp, F. and Schneider, W. 1994. Einige Säugetiere aus dem Nahr-Al-Khabur-Gebiet, NE- Syrien. *Säugetierkundliche Mitteilungen* 35: 177-183.
- Nadachowski, A., Smielowski, J., Rzebiak-Kowalska, B. and Daoud, A. 1990. Mammals from the Near East in Polish collection. *Acta zoologica cracoviensia*, 33: 91-120.
- Obuch, J. 2001. Dormice in the diet of owls in the Middle East. *Trakya Univ. Journal of Scientific Research* 2: 145-150.
- Pradel, A. 1981. Biometrical remarks on the Hamster *Cricetulus migratorius* (PALLAS 1773) (Rodentia, Mammals) from Krak des Chevaliers (Syria). *Acta zoologica cracoviensia* 25: 271-292.
- Qumsiyeh, M.B. 1996. *Mammals of the Holy Land*, 389 PP. Texas Tech University Press. USA.
- Raczynski, J. and Ruprecht, A.L. 1974. The effect of digestion on the osteological composition of owl pellets. *Acta Ornithologica* 14: 25-38.
- Rifai, L., Al- Melhim, W.N. and Amr, Z.S. 1998. On the Diet of the Barn Owl, *Tyto alba*, in Northern Jordan. *Zoology in the Middle East* 16: 31-34.
- Ruprecht, A.L. 1979. Food of the Barn owl, *Tyto alba guttata* (C.L.Br.). *Acta Ornithologica* 16 : 493-511.
- Shehab, A.H., Kowalski, K. and Daoud, A. 1999. Biometrical remarks on the Golden Hamster *Mesocricetus auratus* (WATERHOUSE, 1839) (Cricetidae, Rodentia) from Ebla (Northern Syria). *Acta zoologica cracoviensia* 42: 403-406.
- Shehab, A.H., Samara, F., Daoud, A. and Kowalski, K. 2000. Role of Owls in Biological Control of Rodents in Syria. *Damascus University Journal for Agricultural Sciences* 16 (2): 41-51.
- Shehab, A.H., Daoud, A., Kock, D. and Amr, Z. 2004. Small mammals recovered from owl pellets from Syria (Mammalia: Soricidae, Chiroptera, Rodentia). *Zoology in the Middle East* 33: 27-42.
- Shehab, A.H. 2005. Food of the Barn owl (*Tyto alba*) in Southern Syria. *Acta zoologica cracoviensia* 48 A: 35-42.