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MAMMALIAN FAUNA OF AYUBIA NATIONAL PARK DISTRICT ABBOTTABAD KHYBER-PUKHTOONKHWA PROVINCE PAKISTAN

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ABSTRACT

Twenty two species of mammals belonging to 2 species of Insectivora, 6 of Chiroptera, 1 of Primates, 6 of Carnivora and 7 of Rodentia were found inhabiting the protected Ayubia National Park, Khyber-Pukhtoonkhwa province. Details about the current status, feeding habits, relative abundance, nesting and breeding etc are given. The park has now become a permanent breeding territory of leopard, *Panthera pardus millardi*.

Key words: National Park, Mammalian fauna, relative abundance

INTRODUCTION

National Parks are established with a primary aim of protecting the landscape, fauna and flora in its natural state. Wildlife of National parks of Pakistan as a unit is poorly known. More so is the case with mammalian fauna. The Himalayan moist and semi-moist temperate forest of Khyber-Pakhtoonkhwa province is the richest habitats for mammals in Pakistan.

Some information about various faunal groups or individual species inhabiting national parks of Pakistan is available in the publications of Rasool (1981, 1990), Blumstein (1992a, b & 1994) on Khunjerab National Park; Ahmad (1989) on Kirthar National Park, Sindh; Sahi (1993) on the fauna of Kashmir Himalaya; Thomas (1908) on birds of Ayubia National Park; Anwar and Chaudhry (2000) on Galliat; Shafique *et al*. (2002) on Chilton Hazarganji National Park; Shafique and Barkati (2002) on Chiltan wild goat and Shafique (2004) on small mammals of Chitral Gol National Park, NWFP.

Ayubia National Park (ANP) is one of the twenty three national parks of the country located at the right bank of river Jhelum in Khyber- Pakhtoonkhwa. The present communication is part of a comprehensive study carried out on the fauna and flora of ANP during the period 1997 to 2000 describing the mammalian fauna of ANP.

MATERIALS AND METHODS

Following methods were employed to study the mammalian fauna. Mist nets and Tuttle traps were used for trapping bats. Tuttle traps were designed and prepared locally. Bats collide with the wires of the traps and fall unharmed inside the collecting bag.

"Live traps" were used to catch the mammals unharmed. These traps were activated by a bait pan in the center of the trap. These were found useful for trapping small mammals such as rodents and some insectivores. Live traps were checked daily in the morning to prevent mortalities. Animals were marked by punching holes in the ears and clipping off the toes.

Capture & Recapture Method: The number of small rodents was estimated by capture-recapture method. A known number of animals were marked and released in the wild. After one week, individuals were recaptured from the population. The number of marked individuals caught second time was noted. The ratio of marked to unmarked individuals in the sample was estimated following the Peterson Index of Relative Population Size.

Direct Observations: The area was surveyed to determine the population of carnivores following the "Strip Census Method". Transacts of 3 to 4 km long and 100 meter wide were searched-out. Indirect evidences such as droppings, pugmarks and animals (wildlife and livestock species) preyed upon by carnivores were taken into account.

Tomahawks & Sherman's live traps were also used to capture animals alive and unharmed. This method provided excellent results.

Flying Squirrels: In the present study about 94 specimens of two species of flying squirrels (*Petaurista petaurista alliventer* & *Hylopetes* (*Eoglaucomys*) *fimbriatus*) were captured and detailed information about their body mass, sex, reproductive condition and some ecological features were recorded.

Flying squirrels were captured using baited (apples, potatoes and peanut butter etc.) "live traps". Moreover, "Tomahawk traps" (National Trap Corp., P.O. Box 302, Tomahawk, Wisconsin, USA), were installed on trees used by the squirrels for feeding and roosting. Traps were fixed at a height of 4 to 10 m, a frequent perching height during the feeding and resting sessions.

Flying Squirrels were also captured through mist nets set out in the gaps between the trees. The mist nets are made up of fine nylon mesh threads tightened on a string structured frame sectioned into panels (Nagorson and Peterson, 1980) with loops on each side of panels. Size of the net (Bleitz Wildlife Foundation, Hollywood, California) may vary from 2 x 6m to 2 x 12.5m. It can be used according to the space available.

Flying squirrels were located with the help of powerful searchlights of different trade marks (Maglite, manufactured by MAG instrument – Ontario Calif, USA – chargeable - and backed by 6V. battery and National Mighty Light Krypton - Japan).

All photographs were taken at site by the first author himself by using Cannon T-70 and Pentax K1000 (Camera bodies) FD 50mm, zoom lens FD 35 - 70mm (macro lens), zoom lens 300mm, 120 - 600mm telephoto and extender FD 2*X*, while Telescope 15*X*-60*X* x 60mm, Swift (Japan) with camera adopter.

RESULTS

Study Area: ANP is situated in the Galliat Forest Division of Abbottabad district, Khyber-Pukhtoonkhwa province between 34^{o}-$1^{/}$ to 34^{o}-$3.8^{/}$ N latitude and 73^{o} $22.8^{/}$ to 73^{o}-$27.1^{/}$ E longitude (Fig.1). Originally it spreads over an area of 1684 hectares which was later on extended to 3312 hectares.

The Park is surrounded by many important villages: Mallach and Passala on the west, Darwaza on the south, Mominabad, Riala and Ramkot in the south-east and the Lahur in the east. In the north, the park is bounded by the south facing slopes of Miranjani hills, the top most ridge in the park as well as in the Galliat's forests, and two big villages, Khan Kallan and Khan Khurd located in the north-east.

The main theme of the creation of park was to conserve the ecosystem and biodiversity of the area as well as to develop the recreational spots for tourism. The altitude ranges from 1600 to 3000m. from the sea level. Being located in the Western Himalayan moist-temperate region, the area is semi-rugged mountainous, consisting of fairly dense forests of conifers, mixed with broad leave trees and a mixture of luxuriant shrubs and herbs.

The climate of ANP may generally be defined as temperate and moist as it is located at high altitude, affected heavily by monsoon rainfalls. The summers are therefore moderate and winters are severe with heavy snowfall. Average precipitation ranged from 1642 to 2642 mm. annually. The temperature ranges from below zero to over 29 ^{o}C.

Details of species of Mammals observed during the 3 years of study in the ANP are given in Table 1. The mammalian fauna comprised of 22 species belonging to 5 orders viz Insectivora (2 spp), Chiroptera (6 spp), Primates (1 sp.), Carnivora (6 spp) and Rodentia (7 spp).

System of classification employed by Roberts (1997) is followed in the present study.

Insectivores: Two species of Insectivores were observed i.e. House shrew, *suncus murinus tytleri* Blyth and Asiatic white toothed shrew *Crocidura pullata* Miller. House shrew was relatively more abundant (Table 2), mostly observed at the borders and less commonly present in the fairly dense forest of the Park. Both species were observed throughout the year but less during winter. Both species are resident and breed in the park.

Chiropterans: Six species of Chiropterans were observed; all belong to family Vespertilionidae (Table 1). None of them were the permanent resident of the area except the tube-nosed bat which was resident but locally moves altitudinally during winter. Of the six species of bat, dark whiskered bats were abundantly present in the area especially during summer and autumn but migrate during winter. All bats were present at the altitude of 2300 to 2500m above the sea level (ASL) but never observed below 2300m in the Park.

Primates: Only a single species of Primates, Himalayan rhesus, *Macaca mulatta villosa* True belonging to family Cercopithecidae was observed in the Park. They were seen at the altitude of 1600-2700m ASL and were the permanent resident of the area. Despite their categorization as vulnerable or near to threatened in the country, this primate was abundantly present in ANP. They travel in the form of large herds. Each herd consists of 50 to 70

individuals. Their main density was usually seen near the resorts where garbage and human wastes is thrown. They also shared vegetation as food with the flying squirrels.

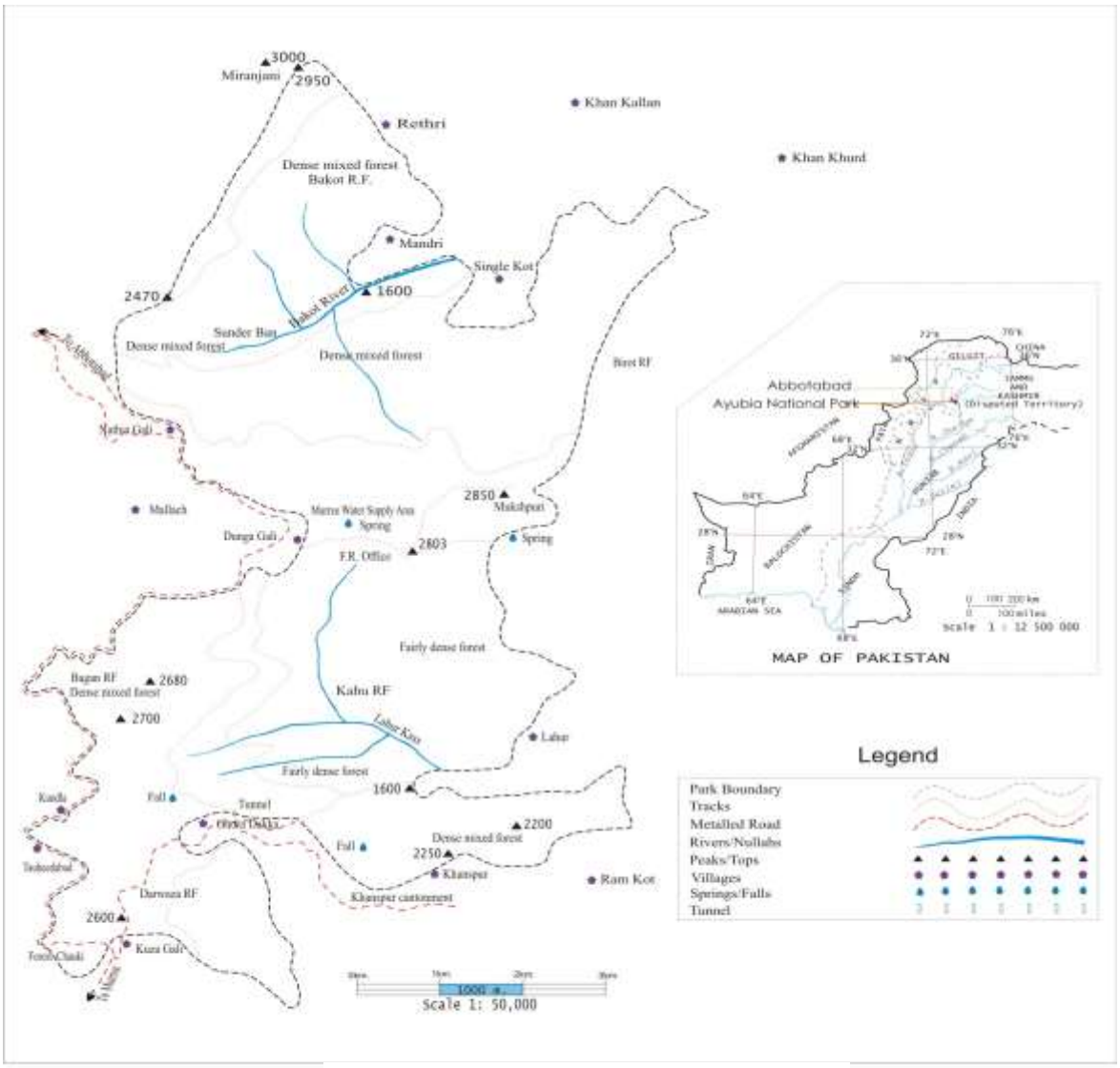

Fig. 1. Map of Ayubia National Park.

Carnivores: Six species of carnivores belonging to 4 families were found. Kashmir hill fox (Canidae) were quite common; they are the permanent resident of the area at the altitude of 1600-2800 m above the sea level. They were observed round the year (Table 2), seen more commonly during winter as compared to Asiatic jackal which was very rare and occasionally seen during the study period (Table 2) at low altitudes near the valley bottom. They mainly feed on birds and rodents.

A single species of yellow-throated marten, *Martes flavigula* Boddaeret (Mustellidae) was observed in the study area at the height of 1600-2600m ASL. It was quite common in the Park and seen round the year. They are the permanent resident of the area and were more common during summer. They are endemic and prefer to adapt moist-coniferous forests of the region. This species is almost of the size of domestic cat and is arboreal. They can climb on the top of the tree in search of birds and their nestlings and especially flying squirrels.

The fauna of the Park also includes a single species of the Kashmir masked palm civet, *Paguma larvata grayi* Schwartz (Viverridae), an arboreal mammal which was present at the altitude of 2000-2600m and is permanent

resident of the area (Table 2). It is extremely rare and feed on rodents and birds. This species is considered as endangered at the country level.

Table 1. Checklist of Mammals of Ayubia National Park.

1. Order: Insectivora	
1.1. Family: Soricidae	
1. House shrew	*Suncus murinus tytleri* Blyth, 1859
2. Asiatic White-toothed Shrew	*Crocidura pullata* Miller, 1911
2. Order: Chiroptera	
2.1. Sub Order: Microchiroptera	
2.1.1. Family: Vespertilionidae	
3. Dark Whiskered Bat	*Myotis muricola* Gray, 1846
4. Common Serotine	*Eptesicus serotinus* Schreber, 1774
5. Leisler's Noctule	*Nyctalus leisleri* Kuhl, 1818
6. Himalayan Pipistrelle	*Pipistrellus javanicus* Thomas, 1915
7. Long-eared Bat	*Plecotus austriacus* Fischer, 1829
2.1.1.1. Sub Family: Murininae	
8. Tube-nosed Bat	*Murina tubinaris* Scully, 1881
3.Order: Primates	
3.1. Family: Cercopithecidae	
9. Himalayan Rhesus	*Macaca mulatta villosa* True, 1894
4. Order: Carnivora	
4.1. Family: Canidae	
10. Asiatic Jackal	*Canis aureus* Linnaeus, 1758
11. Kashmir or Hill Fox	*Vulpes vulpes griffithi* Blyth, 1854
4.2. Family: Mustellidae	
4.2.1. Sub Family: Mustellinae	
12. Yellow-throated Marten	*Martes flavigula* Boddaert, 1785
4.3. Family: Viverridae	
13. Kashmir Masked Palm Civet	*Paguma larvata grayi* Schwartz, 1913
4.4. Family: Felidae	
14. Leopard Cat	*Prionailurus bengalensis trevelyani* Pocock, 1939
15. Common Leopard or Panther	*Panthera pardus millardi* Pocock,1930
5. Order: Rodentia	
5.1. Family: Pteromyidae	
16. Red Himalayan Giant Flying Squirrel	*Petaurista petaurista albiventer* Gray, 1834
17. Small Kashmir Flying Squirrel	*Hylopetes* (*Eoglaucomys*) *fimbriatus* Gray, 1837
5.2. Family: Hystridae	
18. Indian Crested Porcupine	*Hystrix indica blanfordi* Muller, 1911
5.3. Family: Muridae	
5.3.1. Sub Family: Murinae	
19. Himalayan Wood Mouse	*Apodemus rusiges* Miller, 1913
20. Turkestan Rat	*Rattus turkestanicus* Satunin, 1903
21. House Mouse	*Mus musculus bactrianus* 1846
22. Murree Vole	*Hyperacrius wynnei* Blanford, 1881

Table 2. Seasonal variation in number of individuals and related ecological information about mammalian species from March 1997 to February 2000.

Species	1997-1998				1998-1999				1999-2000				Total	Relative Abundance	Altitude (m)	Status
	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter				
Suncus murinus tyleri	248	813	516	176	414	1256	966	610	376	1440	832	249	7896	4.068	1650-2500	D
Crocidura pullata	84	158	98	45	152	288	207	96	111	216	166	63	1684	0.867	2000-2700	D
Myotis muricola	342	2418	3834		524	3547	5764		458	2866	6354		2610	1.344	2300-2500	SM
Epesicus serotinus					1					2			3	0.001	2350-2450	O
Nycalus leisleri	36	142			11	324			86	541			1140	0.587	2000-2500	SM
Pipistrellus javanicus babu					1				1				1	0.0005	2400	VG
Plecotus austriacus					1				1				2	0.001	2400-2450	O
Martina tubinaris	2	23	8			56	14			22	6		131	0.067	2300-2500	RAM
Macaca mulatta villosa	218	344	337	136	382	478	412	148	204	546	494	178	3877	1.99	1600-2700	D
Canis aureus		2				1	1						3	0.001	1600-1700	O
Vulpes vulpes griffithi	8	5	11	18	15	4	17	26	16	7	25	31	183	0.094	1600-2800	D
Martes flavigula	24	38	27	16	35	54	43	28	40	62	47	15	429	0.221	1600-2600	D
Paguma larvata grayi	3	2	2	1	2	6	2	2	5	2	8	3	38	0.019	2000-2600	D
Prionailurus bengalensis trevelyani						1						1	1	0.0005	2450	VG
Panthera pardus millardi	4	1	2	4	4	2	3	5	4	2	4	7	42	0.021	1600-2650	D
Petaurista petaurista albiventer	490	416	458	284	748	612	680	437	706	532	624	390	6377	3.285	1900-2700	D
Hylopetes fimbriatus	643	584	680	764	1072	724	1140	1215	1163	870	1284	1434	11573	5.962	2100-2700	D
Hystrix indica blanfordi	4	8	6		6	17	10		2	12	8		73	0.037	1600-2700	RAM
Apodemus rusiges	3543	3815	3128	1845	5670	6534	5220	2672	4890	6170	5364	1754	50605	26.073	1600-2600	D
Rattus turkestanicus	1234	1752	816	178	2026	3366	965	154	1835	2747	615	64	15752	8.116	2800-2600	D
Mus musculus	1432	2274	1343	164	2575	3646	2434	213	1982	2722	1690	114	20589	10.608	1600-2600	D
Hystrix brachyura	6458	7864	7184		10657	13590	11253		9646	12560	9850		89072	45.893	2800-2700	D
Total	14773	20659	18450	3631	24295	34505	29132	5606	21535	31319	27371	4302	194083			

Status: D = Resident, SM = Summer migrant, O = Occasional, RAM = Resident altitudinal migrant, VG = Vagrant.

The family Felidae comprises of two cat species viz. leopard cat, *Prionailurus bengalensis trevelyani* Pocock and common leopard or panther, *Panthera pardus millardi* Pocock. leopard cat is quite vulnerable and was seen only once during the study period at the altitude of 2450m. The common leopards were present at the altitude of 1600-2650m and presently it occupies the permanent breeding ground of Kao forest in the Park and its surroundings. Their population is continuously rising probably because of the ban on hunting and availability of monkeys as food.

Rodents: Seven species of rodents belonging to 3 families were observed. Two species of flying squirrels viz. red Himalayan giant flying squirrel, *Petaurista petaurista albiventer* Gray and small Kashmir flying squirrel, *Hylopetes (Eoglaucomys) fimbriatus* Gray were present abundantly round the year. The small Kashmir flying squirrel weighing about ½ kg were more common and showed much aggressive behaviour, as compared to the red Himalayan giant flying squirrel whose weight averaged 1½ kg, but seems to be of docile nature. Both the species are sympatric and occupy snags and old trees for diurnal roosting and breeding. The two species do not use the same plant at the same time for feeding and roosting. Ninety percent snags were inhabited by flying squirrels, and each one had a couple or single squirrel living in it. They are arboreal mammals, feed on plant materials and never come on the forest floor.

Only one species of family Hystridae, Indian crested porcupine, *Hystrix indica blanfordi* Muller was present. It is a resident altitudinal migrant found at 1600-2700m. During winter it migrates to lower altitudinal ranges. It also forms territorial markings by scratching. It feeds usually on the roots of herbs and shrubs but also on nuts, leaves and grasses.

The family Muridae of order Rondentia comprised of four species belonging to four different genera (Table 1), all were abundantly present and permanent resident of the area. The two species of the mouse were found at the altitude of 1600-2600m and were seen round the year. The house mouse is a relatively small animal and found at the periphery of the Park as it has generally close association with human habitation compared to Himalayan wood mouse which is slightly larger in size compared to house mouse. They were always found in the wild on the grassy slopes. Turkestan rat, commonly called house rat were found at the altitude of 2000-2600m and are permanent resident of the area. During spring and summer they were abundant in the field and in autumn and winter, prefer to live with the human population.

The Murree Vole is the most common species among the mammals and a permanent resident of the park, found at the altitude of 2000-27000m. It is an endemic species and makes shallow as well as deeper tunnel during which it feeds on the roots of grasses, herbs and shrubs. It is nocturnal as well as diurnal and hibernates during the winter.

DISCUSSION

Biological diversity of the protected areas (National Parks) was never evaluated systematically. In the present study 22 mammalian species were observed in Ayubia National Park (33 sq km) – a protected area in the western-Himalayan mountainous range. Shafique (2004) working on small mammals in Chitral Gol National Park recorded 15 small mammals over an area of 77 sq km and Shafique et al (2002) reported 19 species of mammals in Chiltan Hazarganji National Park Baluchistan, spreading over an area of 150 sq km. Farooq (1989) working on Kirthar National Park (1200 sq km), Sindh mentioned 29 mammals from an area of 1200 sq km. Some basic information about the wildlife of Khunjerab National Park is provided by Rasool (1981, 1990). Blumstein (1992a) discussed the behavioral ecology of golden marmots, red foxes and Mustela of Khunjerab National Park. The checklist presented here is almost the first complete existing account of mammalian fauna of any protected area of Pakistan. Earlier studies on mammals of Pakistan, other than national parks, are those of Roberts (1977, 1997), Siddiqui (1961, 1969), Mirza (1969), Ahmad and Ghalib (1975) and Schaller (1976). Fulton (1903), Schaller (1973, 1977) and Schaller and Mirza (1971) dealt with individual species.

Wildlife conservation is dependent on strict control on hunting the threatened species. Mismanagement and lose control will result in decline and local extinction of some species like Leopard, *Panthera pardus* (many cases of killing of this threatened species were noted); Jackal, *Canis aureus;* Hill Fox, *Vulpes vulpes griffithi;* Yellow Throated Marten, *Martes flavigula;* Kashmir Masked Palm Civet, *Paguma larvata;* Flying Squirrels, *Petaurista* and *Hyploptes;* Himalayan Rhesus, *Macaca mulatta villosa.*

Increase in the population of Leopard (Rhesus) and other species clearly showed that animals are enjoying the protective environment. The small squirrel, once declared as a threatened species by IUCN, is no more an endangered species.

The two species of flying squirrels were observed defending their feeding and nesting territories intensively. They are not confined to a single food item or to a single tree. They used to visit a number of different plant species in search of variety. Prater (1965) and Roberts (1977) mentioned that flying squirrel produce two young ones in a litter size. The results of present study based on many years field study showed that in case of *Petaurista* only one

young is produced. However, in case of *Hylopetes* breeding season and size of litter is not clear. Two embryos were observed in only few recently pregnant females.

REFERENCES

Ahmad, M. F. (1989). *Bio-ecological complex of Kirthar National Park, Sindh.* A thesis (M. Phil), Karachi University, 151 pp.

Ahmad, M. F. and S. A. Ghalib (1975). A checklist of Mammals of Pakistan. *Rec. Zool. Sur. Pakistan*, VII (1 and 2): 1-33.

Anwar, M. and A. Chaudhry (2000). Common leopard *Panthera pardus* our endangered heritage needs special conservation. *Tiger Paper*, 27 (4): 14 – 16.

Blumstein, D. T. (1992a). *The Behavioural Ecology of Golden Marmots and Community Ecology of Dhee Sar (Khunjerab National Park).* A Progress Report, November 1991, Dept. of Zoology, University of California, Davis.

Blumstein, D. T. (1992b). Summer Diets of Tibetan Red Foxes in Khunjerab National Park, Pakistan. *Journ. Mammalogy*, (Submitted).

Blumstein, D. T. (1994). New Records of *Mustela* from Khunjerab National Park, Pakistan. *J. Bombay. Nat. Hist. Soc.* in press (one page).

Fulton, H. T. (Capt.) (1903). Rough notes on the Mammalia of Chitral, *J. Bombay Nat. Hist. Soc.*, 14 (4): 758 pp.

Mirza, Z. B. (1969). *The Small Mammals of West Pakistan,* Vol. 1, Rodentia, Chiroptera, Insectivora, Lagomorpha, Primates and Pholidota, *Central Urdu Board.* Lahore (in Urdu).

Prater, S. H. (1965). *The Book of Indian Animals* 2nd ed. Bombay Natural History Society, Bombay. 324 pp.

Nagorsen, D. W. and R.L. Peterson (1980). *Mammal Collectors' Manual*. Life Sciences Miscellaneous Publications Royal Ontario

Roberts, T.J. (1977). *The Mammals of Pakistan*. Oxford University Press, Ernest Benn Limited, London & Tonbridge, 361 pp.

Roberts, T J. (1997). *The Mammals of Pakistan* (Revised Ed.) Oxford University Press, New York, 525 pp.

Sahi, N. S. (1993). Wildlife conservation sites in Kashmir, Himalaya. *Tiger Paper*, 20 (2): 28 – 31.

Schaller, G. B. (1973). Observations on Himalayan Tahr (*Hemitragus jemlahicus*). *J. Bombay Nat. Hist. Soc.*, 70 (1): 1-24.

Schaller, G. B. (1976). Mountain Mammals in Pakistan. Oryx, *J. Fauna Preserv. Soc.*, 13 (4) 351-356.

Schaller, G.B. (1977). *Mountain Monarchs*: Wild Sheep and Goats of the Himalaya. Univ. of Chicago Press. P. 425.

Schaller, G. B. and Z. Mirza (1971). On the behaviour of Kashmir markhor (*Capra falconeri cashmiriensis*). *Mammalia.* 35: 548-66.

Shafique, C.M. and S. Barkati (2002). Status and Ecology of Chiltan Wild Goat, *Capra aegagrus chialtanensis* (Caprinae). *Rec. Zool. Surv. Pakistan*, 14: 81 – 93.

Shafique, C. M., A. Hassan and Q.N. Arain (2002). Wildlife of Chiltan Hazarganji National Park, Balochistan. *Rec. Zool. Surv. Pakistan*, 14: 55 -79.

Shafique, C. M. (2004). Small Mammals Baseline Study in Chitral Gol National Park, NWFP, Pakistan. Report submitted to WWF-Pakistan, Lahore. 41pp.

Siddiqui, M.S. (1961). Checklist of Mammals of Pakistan with particular reference to the Mammalian Collection in the British Museum (Natural History) London. *Biologia*, 7 (1 & 2) 93-225.

Siddiqui, M.S. (1969). Fauna of Pakistan, *Agricultural Research Council,* Government of Pakistan, Karachi.

Thomas, T. (1998). Birds of Ayubia National Park, NWFP, Pakistan. Pakistan *J. Ornith*., 2 (1 – 2): 45 – 61.

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