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MIGRANT LEVANT SPARROWHAWKS (*ACCIPITER BREVIPES*) AT ELAT, ISRAEL: MEASUREMENTS AND TIMING

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ABSTRACT.—We banded 218 migrating Levant Sparrowhawks (*Accipiter brevipes*) in the course of a raptor banding project in Elat, Israel during the spring of 1996. To our knowledge, this is the largest sample examined in a single season. We caught 73 adult males and 55 females, and 48 second-year (SY) males and 42 SY females. On average, male morphometric measurements were 9% smaller than those of females. Only 7% of all Levant Sparrowhawks caught showed obvious molt, 19% had obvious ectoparasites and none had asphalt contamination.

KEY WORDS: *Levant Sparrowhawk*; Accipiter brevipes; *migration*; *morphometric measurements*; *Israel.*

Migratorio *Accipiter brevipes* en Elat, Israel: medidas y tiempos

RESUMEN.—Nosotros marcamos 218 *Accipiter brevipes* migrando en el curso del proyecto de marcar rapace en Elat, Israel durante la primavera en 1996. Con nuestra conocimiento, esta muestra fue la mas grande examinada en un tiempo singular. Nosotros pescamos 73 machos adultos y 55 hembras adultas, y 48 machos del segundo año (SY) y 42 SY hembras. En el promedio, medidad morfometricas del macho eran 9% mas chicos que eso de la hembras. Solo 7% de todo los *Accipiter brevipes* pescados enseñaron mudar obvio, 19% tenian ectoparasiticos obvio y ninguno tenia contaminación asfalto.

[Traducción de Raúl De La Garza, Jr.]

Israel, located at the hub of the only land bridge between three continents, is a major junction for birds migrating south from Eurasia to Africa in autumn and north to their breeding grounds in spring (Safriel 1968). Christensen et al. (1981) first drew attention to the importance of Israel in raptor migration and, since then, several surveys of the raptor migration in Israel have been made in both spring and autumn (Shirihai 1987, 1988, Shirihai and Yekutiel 1991, Shirihai and Christie 1992, Yosef 1995).

In spring, the Red Sea and the Gulf of Aqaba act as a long deflection barrier forcing many northbound raptors to concentrate at Elat, Israel (Grieve 1996). Elat is situated at the northern edge of almost 2000 km of continuous desert in the Sahara and Sinai. Therefore, many birds land at Elat to rest after crossing these deserts (Yom-Tov 1988). One such species is the Levant Sparrowhawk (*Accipiter brevipes*). Levant Sparrowhawks are considered scarce and information on their distribution, populations and status is limited (Cramp and Simmons 1980). Wallace (1983) estimated that there were probably only a few hundred pairs in existence. They virtually disappear from their breeding grounds in winter, passing down the Nile Valley to unknown areas in Africa. Recent studies have illustrated that in spring, they concentrate in the Elat-Aqaba regions in numbers ranging from 45 000–55 000 individuals (Safriel 1968, Shirihai 1987, Yosef 1995) and migrate north along the rift valley towards Syria and Lebanon (Frumkin et al. 1995). Recoveries of banded sparrowhawks come from Romania, Ukraine, Russia and Syria.

The Levant Sparrowhawk is a monotypic species and females can be up to 10% larger than males (Cramp and Simmons 1980). Males have blue-grey underparts and darker flight feathers. Underparts are buff or pinkish on the breast and underwing coverts, and the underwing is white with black ends to the primaries (Cramp and Simmons 1980). In contrast, females have brown-grey underparts. Juveniles have underparts a darker brown than females and are heavily streaked with tear-shaped elongated spots. Underwing coverts are narrowly barred and only the tips of the primaries are

Table 1. Biometrics of Levant Sparrowhawks (*Accipiter brevipes*) caught and banded at Elat, Israel during spring 1996. M denotes males and F females. Numbers in parentheses are those taken for skins in museums by Cramp and Simmons (1980).

	Wg Chord (mm)		Wg Spread (mm)		Body Mass (g)		Culmen (mm)		Hallux (mm)		Tail (mm)		Body Length (mm)	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Adults:														
Mean	219.2 (220	234.7 235)	689.0	736.0	174.8	218.8	13.0 (12.5	14.0 14.1)	13.6 (13.4	14.8 14.6)	155.1 (154	169.6 166)	318.6	344.0
SD	4.7	5.5	4.2	4.5	21.2	22.7	0.7	0.6	0.6	0.4	5.5	9.4	9.5	8.7
N	73	55	5	5	72	55	11	9	12	9	14	13	12	10
Min.	209	219	685	730	140	183	12.2	13.0	12.0	14.0	145	155	303	325
Max.	229	247	695	741	275	290	14.4	14.9	14.4	15.2	165	184	336	352
Ratio F/M	1.07		1.07		1.25		1.08		1.09		1.09		1.08	
Juveniles:														
Mean	211.4 (212	226.9 231)	664.4	730.0	160.6	198.5	12.2 (12.3	13.7 13.4)	13.6	15.7	147.4 (152	160.2 165)	311.6	336.0
SD	6.0	6.7	11.5	14.1	13.9	22.5	1.0	0.5	0.6	1.8	9.7	10.9	7.1	12.1
N	47	43	8	2	47	43	9	6	9	6	10	6	10	5
Min.	198	208	645	720	140	148	10.0	13.1	12.7	14.5	134	139	300	320
Max.	230	237	680	740	200	240	13.3	14.5	14.5	19.3	167	170	325	352
Ratio F/M	1.07		1.10		1.24		1.12		1.15		1.09		1.08	

= 9, $P = 0.0059$) and heavier body mass ($t = -3.58$, df = 46, $P = 0.0008$) but not hallux ($t = -1.0$, df = 8, $P = 0.346$), than juveniles. In females, no differences were found in wingspread ($t = -0.25$, df = 1, $P = 0.844$), culmen ($t = -0.36$, df = 5, $P = 0.9156$), hallux ($t = -1.581$, df = 5, $P = 0.1747$), tail length ($t = -0.56$, df = 5, $P = 0.5994$) and total body length ($t = -0.886$, df = 4, $P = 0.4259$); only wing chord ($t = -14.302$, df = 42, $P = 0.0001$) and body mass ($t = -8.916$, df = 42, $P = 0.0001$) were significantly different between adults and juveniles. Most female measurements were larger by 9% than those of males and in juveniles (8.9%) (Table 1).

The differences between the sexes and ages are small when compared to the biometrics of similar species. While Levant Sparrowhawk females are larger than males by approximately 9% (as an average of seven measurements), in Shikra (*A. badius*) and in Goshawk (*A. gentilis*) the difference can reach 20%, and in Eurasian Sparrowhawks (*A. nisus*) these differences can be as great as 25% (Cramp and Simmons 1980). Our data are similar with the biometrics taken only from skins in museums by Cramp and Simmons (1980).

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darker. They have a pale throat divided by a dark line and the tail is paler than in females (Cramp and Simmons 1980). The only morphometric measurements mentioned in Cramp and Simmons (1980) are from museum skins.

Few migrant raptors are banded in the Middle East, Africa and Eurasia. Because of this, we reinitiated a raptor banding project at Elat to further our understanding of the migration of raptors through band recoveries (Clark 1995). A previous project was initiated in Elat in 1984 by the Society for Protection of Nature in Israel (SPNI; Clark et al. 1986), but was discontinued after spring 1988. In the spring of 1996, we (International Birding Center in Elat, National Aviary in Pittsburgh, WWF-International and Israel Nature Reserves Authority) restarted the project with secondary aims of collecting data on the biometrics, molt, plumage, parasites and asphalt contamination of migrants and to improve our capture techniques.

We captured and banded 218 Levant Sparrowhawks between 13 April–3 May 1996. To our knowledge, this is the largest sample examined to date of sparrowhawks caught in the same season, giving the largest amount of morphometric data yet available from live birds of this species.

MATERIALS AND METHODS

Levant Sparrowhawks were captured and banded between 13 April–3 May 1996 in the area immediately to the north of Elat, Israel and farther north (~35 km) to the palms of Kibbutz Samar. A fixed raptor banding station was set up in the agricultural fields of Kibbutz Elot that consisted of bow-nets, mist nets and dho-gazas operated from a blind (Clark 1970, 1981, Clark et al. 1986). In addition, Bal-chatri traps (Berger and Mueller 1959) were used from a vehicle to capture perched or low-flying raptors and box traps were placed in the date palm plantations. A set of 10 6-m-high mist nets were used on the south side of a row of 6–7-m-high trees.

All Levant Sparrowhawks captured were fitted with appropriate-sized Tel-Aviv University bands. The species, age (either SY or ASY), sex, wing chord (unflattened) and body mass of each raptor were noted on a banding form. Wingspread, length of culmen, hallux, and tail, and overall length were also taken from a smaller subset of birds. Date, time and capture device were also recorded. Recaptures were noted and weighed. The birds were inspected for recent molt of remiges and rectrices, for ectoparasites (ticks, lice, or mites) and for asphalt contamination of their feathers.

We aged Levant Sparrowhawks based on plumage and molt (Clark and Yosef, In-hand Palearctic Raptor Identification Guide, in prep.). In addition, eye color was used as an indication of age since adults have brown eyes with a slight reddish cast and juveniles have pale to medium brown eyes.

We used Student *t*-tests for comparison of data between age groups and sexes. We chose $P = 0.05$ as the minimum acceptable level of significance.

RESULTS AND DISCUSSION

We captured a total of 656 raptors during the spring of 1996, and the second most numerous species caught was the Levant Sparrowhawk (33.2%). The majority (79.4%) were captured during 19–29 April (173 sparrowhawks in 11 days).

Only 7% of all sparrowhawks caught showed obvious molt, 19% had obvious ectoparasites and none had asphalt contamination. Most sparrowhawks were captured early in the morning and late in the evening, either prior to take-off in the morning (0700 H) or when they came to roost in the evenings (1800 H). Few were caught at midday because most sparrowhawks soared to great heights. Most (131, 60.1%) were caught on Bal-chatris, but many were also caught in box traps (38, 17.4%) and at the trapping station (47, 21.6%).

Seven Levant Sparrowhawks were recaptured once and the number of days between captures ranged from 0–5 d (median = 3). Only one of these birds gained body mass between captures and the other six lost an average of 4.5% of their body mass.

We caught 73 (33.5%) adult males and 55 (25.2%) adult females, and 48 (22.0%) second year (SY) males and 42 (19.3%) SY females for an overall sex ratio of 1.3:1 (1.3:1 in adults, 1.1:1 in juveniles). Average wing chord ($t = -53.085$, df = 53, $P = 0.0001$), wingspread ($t = -44.813$, df = 4, $P = 0.0001$), body mass ($t = -33.211$, df = 53, $P = 0.0001$), culmen ($t = -8.315$, df = 8, $P = 0.0001$), hallux ($t = -8.222$, df = 8, $P = 0.0001$), tail length ($t = -11.204$, df = 12, $P = 0.0001$) and total body length ($t = -31.754$, df = 9, $P = 0.0001$) were significantly smaller in adult males than in adult females (Table 1). In juveniles, females also had a longer wing chord ($t = -9.656$, df = 43, $P = 0.0001$), wingspread ($t = -16.0$, df = 1, $P = 0.0397$), culmen ($t = -13.0$, df = 5, $P = 0.0001$), hallux ($t = 4.443$, df = 5, $P = 0.0067$), tail length ($t = -6.703$, df = 5, $P = 0.0011$), total body length ($t = -7.869$, df = 4, $P = 0.0014$) and heavier body mass ($t = -23.308$, df = 43, $P = 0.0001$). Adult males had a significantly longer wing chord ($t = -10.636$, df = 46, $P = 0.0001$), wingspread ($t = -12.66$, df = 4, $P = 0.0002$), culmen ($t = -2.828$, df = 8, $P = 0.0222$), tail length ($t = -2.37$, df = 9, $P = 0.0418$), total body length ($t = -3.578$, df