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SIX NEW BREEDING BIRD SPECIES IN ISRAEL DURING 1995–2002

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ABSTRACT

The diverse breeding bird fauna of Israel comprises elements from various zoogeographical regions. This is predominantly attributed to the zoogeographic position of Israel and its high habitat diversity. In this article I provide information on six bird species new to breeding in Israel since 1995: green-backed heron (*Butorides striatus*), purple gallinule (*Porphyrio porphyrio*), painted snipe (*Rostratula benghalensis*), thick-billed lark (*Rhamphocoris clotbey*), wallcreeper (*Tichodroma muraria*), and common mynah (*Acridotheres tristis*). The data provided here on the breeding habits of each species vary in extent. A recently fledged wallcreeper comprises the only indication of the species' breeding in the country, or near its borders. In the cases of the purple gallinule and the painted snipe, adults were found rearing their young, while the green-backed heron and, especially, the thick-billed lark were studied throughout their entire breeding period. The common mynah is a recently introduced species whose local breeding features have not yet been thoroughly studied. The wallcreeper has a Central Palearctic distribution, while the remaining species or subspecies have a desert distribution within the Palearctic or a Paleotropical distribution. It is striking that most of the local breeding events of these species are closely connected to human-induced habitat modifications. With the addition of these six new breeding species, the total number of bird species found to breed in Israel is now 210, although some of these species no longer do so.

INTRODUCTION

Despite its small area, 511 bird species have been recorded to date in Israel (Shirihai, 1996). Of these, over 200 species have been found to breed within the current borders (Shirihai, 1996). Israeli wildlife is comprised of a mixture of species originating from very different zoogeographic regions (Tchernov and Yom-Tov, 1988). About 70% of the breeding avifauna of Israel is regarded to be of Palearctic origin. However, the zoogeographical affinities of these Palearctic species are diverse and comprise Temperate, Mediterranean, Steppe, and Desert elements (Yom-Tov, 1988). About 15% of the local breeding avifauna has an Ethiopian and Oriental zoogeographic origin, while a

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similar percentage of species has a wider distribution range, i.e., Holarctic, Old-World, and Cosmopolitan (Yom-Tov, 1988). Birds of different Palearctic affinities, of Ethiopian and Oriental origins, and of the wider distribution ranges, are all to be found in Israel within a short distance of one another, or, in many cases, jointly forming unique communities of breeding birds.

Those species could not have established breeding populations in the country without the existence of habitats suitable for their needs. Israel is characterized by a very wide variety of habitats within a small geographic area (Tchernov and Yom-Tov, 1988). Extreme desert, which nonetheless features lush oases and salt marshes, is found in the southern parts of Israel. A steppe-like transitional zone occurs as a narrow strip bordering the desert on its northern and western sides. Mediterranean scrub is widespread in central and northern Israel, where some other habitats such as wetlands, cliffs, and sea shores are also found. Of particular note is Mt. Hermon, at the northeasternmost tip of Israel, which is characterized by unique climatic conditions in Israel and as such is home to a unique breeding bird assemblage (Shirihai, 1996).

Neither the zoogeographic position of Israel nor its habitat diversity can account by itself for the richness of the Israeli avifauna. Rather, it is the interaction between these two factors, throughout the zoogeographic history of the southern Levant, which has generated the rich local breeding avifauna (Por, 1975; Tchernov and Yom-Tov, 1988). When birds dispersing from different zoogeographic areas encountered suitable habitats for their needs, they were able to settle and breed within the region (Tchernov and Yom-Tov, 1988).

Human activities have caused pronounced modifications of natural habitats over wide areas of Israel. These have caused substantial changes in the distribution and abundance of many local bird species (Yom-Tov and Mendelssohn, 1988). In addition, introduced species have escaped from or been released into the wild (Yom-Tov and Mendelssohn 1988) and are now to be found in large numbers in certain localities (e.g., Sapir, 2000). Their establishment in the wild may have been facilitated by the already existing human-induced habitat alterations. If habitat alterations and bird introduction continue to take place, the dynamics of the Israeli breeding avifauna is expected to become even more strongly affected.

Data on the Israeli avifauna have accrued mainly since the end of the 19th century and throughout the 20th (summarized in Shirihai, 1996), dramatically increasing the number of bird species known to breed in Israel. Table 1 summarizes the number of bird species known to breed in Israel, as published in different sources throughout the second half of the 20th century. Note the large differences between sources, even those that were published within a very short time of each other. These differences may be a consequence of changes in the area held by Israel during certain periods, different approaches to deciding whether a species is a local breeder or not, or reliance on different sets of references. Nevertheless, genuine discoveries of new breeding bird species throughout this period have also contributed to this apparent increase in the known local breeding avifauna.

In this article I provide field data on six bird species, not previously reported to breed

Table 1
The number of Israeli breeding bird species cited in sources published throughout the second half of the 20th century

Year	Author	No. of breeding bird species
1957	Shmuely	205 ¹
1960	Merom	151 (166) ²
1971	Inbar	134 ³
1986	Paz	163
1987	Hovel	187
1996	Shirihai	202

¹Given as a general figure of both residents (150 species) and summer visitors (55 species), not detailed for each species. ²Additional 15 species, reported to breed in Israel by earlier investigators, are also given. ³Not including occasional breeders.

in Israel, that were found to breed in the country between 1995 and 2002. The data vary in extent because of the specific circumstances of the discovery of each species' breeding events. The breeding biology of some of the species is only poorly described in the literature, and almost nothing is known about their breeding biology in other localities in the Middle East.

METHODS

This account is based on information collected by experienced Israeli birdwatchers during field observations in the last seven years. As such, many observations were anecdotal and much of the breeding information given here does not include extended follow-up of the birds throughout their entire breeding season. Only in one case (thick-billed lark) was extended investigation made possible as part of a survey conducted by the Israel Ornithological Center of the Society for the Protection of Nature in Israel. Data were chiefly provided by means of personal communication, especially through electronic contacts, as the data were stored in the observers' notebooks. In all cases but one (wallcreeper), several observers reported the breeding findings, usually independently. In some cases (e.g., thick-billed lark), breeding was also photographed.

RESULTS

1. GREEN-BACKED (STRIATED) HERON *Butorides striatus* (L. 1758)

Subspecies in Israel. B. S. brevipes.

Global breeding range. Africa, central-eastern and southern Asia, Islands of Indian Ocean, Australia, and South America (Snow and Perrins, 1998).

East Mediterranean breeding range. South Persian Gulf, south Arabia and Sinai along the Red Sea, north up to 28°N, and in Egypt also along the Nile (Snow and Perrins, 1998)

Status in Israel. Rare non-breeding visitor to northern parts of Gulf of Aqaba throughout the year, but chiefly during winter (Paz, 1986; Shirihai, 1996). Nevertheless, the sighting of six birds on 31 July 1999 (pers. obs.) seems to contradict Shirihai (1996), who reported the species to be very rare during June–October, when only single birds usually were seen.

Breeding status in Israel. Never previously reported to breed in Israel. A population of 25–40 pairs breeds in the mangroves of southern Sinai, about 170 km south of Elat (Paz, 1986; Shirihai, 1996; Snow and Perrins, 1998).

Geographic areas of breeding within Israel. Breeding location was off-shore from Elat's north beach, in rafts located about 0.8 km from the shore (29°32'N/34°58'E). These rafts are open-sea fish-growing agricultural farms.

Breeding time. In July 2000, a nest containing a few eggs was found on one of the rafts (Eran Nevo, pers. comm.). On 22 August 2000 a recently fledged juvenile green-backed heron was seen on one of the rafts (pers. obs.; Y. Perlman, pers. comm.). Given the 21–24 days of incubation time and the 27–32 days to fledging (Snow and Perrins, 1998), it is likely that the birds had laid their eggs no later than the beginning of July, possibly even earlier. According to information provided by a local fisherman, the herons started to breed on the rafts in 1999, and their 1999 and 2000 breeding period was between May and August. In August 2000 another pair attempted breeding after the first two pairs had completed their breeding. However, this attempt failed, and breeding was therefore not extended to September. According to Shirihai (1996), the breeding period of the southern Sinai population is between April and September, with fresh eggs recorded from end of April to end of August. Therefore the breeding timing of the Elat birds, possibly originating from the Sinai breeding population, falls within that of the Sinai population. In Sudan, breeding was recorded from June to September (Snow and Perrins, 1998).

Habitat characteristics and nest microhabitat. Nesting location was first (in 1999) on a rigid plastic net on one of the rafts, whereas in 2000 it took place inside plastic boxes, about 30 × 80 cm, set on the sides of the rafts by the fishermen (for this purpose). The green-backed heron usually nests in low bushes or, as in the case of the Sinai population, ca. 50 cm above ground on branches overhanging water in mangroves (Snow and Perrins, 1998). The offshore rafts, positioned in the sea since the late 1980s and substantially developed throughout the 1990s, are constructed mainly from metal and plastic tubes and sheets. As such, they do not contain any vegetation or other complex structures that are even superficially similar to mangrove vegetation (pers. obs.).

General findings of breeding biology. In 1999 only a single pair bred. This pair incubated three eggs and successfully fledged one young. In 2000 two pairs incubated three eggs each and fledged two young and a single young, respectively. Distance

between nests was several dozen meters, which concurs well with Snow and Perrins (1998), who reported that the species nests singly or in small dispersed colonies. Clutch sizes also matched the information given in Snow and Perrins (1998) of 2–4 eggs. A pair, probably one of the nesting pairs in 2000 judging by its fidelity to a specific area on a raft and to a specific nest box of the several available there, probably started a second brood following the fledging of its first brood. Unfortunately, this pair abandoned their nest, most likely due to disturbance caused by maintenance work near their nest on the raft. This seems to contradict Snow and Perrins (1998), who reported that this species produces only one brood. Since the information was gathered from only one farm, covering about 60% of the total area of the rafts in the Gulf tip, it is likely that additional pairs also bred on the rafts during that time. In spring 2001 green-backed herons were also found nesting on the rafts (H. Shirihai, pers. comm.). Yosef et al. (2002) provide detailed information on the herons' breeding in spring 2002, when birds were found to breed earlier in the spring, throughout March. Also of note is that the only inland record of a green-backed heron in Israel was of a juvenile bird on 16–19 May 2002 in Sapir Lake in the Arava Valley (D. Alon, pers. comm.), some 110 km north-northeast of Elat. Though the origin of this bird is unknown, it is likely to have originated from the Elat green-backed heron breeding population.

2. PURPLE GALLINULE *Porphyrio porphyrio* (L. 1758)

Subspecies in Israel. *P. p. caspius*, *P. p. madagascariensis*.

Global breeding range. Most of Africa, SW Europe, western, central, southern, and eastern Asia, and Australia (Snow and Perrins, 1998).

East Mediterranean breeding range. *P. p. madagascariensis* is resident in Egypt, including the Nile Delta (Goodman and Meininger, 1989; Snow and Perrins, 1998). Southern-central Turkey, Caspian Sea, and northwestern Iran populations (and extinct former populations in Southern Turkey and northwestern Syria) are of *P. p. caspius*, while the extremely similar but smaller *P. p. seistanicus* is the subspecies inhabiting central and southeastern Iraq and southern Iran (Snow and Perrins, 1998).

Status in Israel. An occasional visitor to wetlands, chiefly along the coastal plain of western Israel, or the Rift Valley of eastern Israel (Paz, 1986; Shirihai, 1996). Seems to have increased in numbers in recent years, e.g., one to two birds were present in the Ma'agan-Mikhael area between September 1999 and August 2001 (pers. obs.), with an observation of four adults together on 31 August 2000 (B. Granit and T. Ellery, pers. comm.).

Breeding status in Israel. Although *P. p. caspius* was claimed to have bred in the past in the former Hula swamps, there appears to be no strong evidence of its breeding in that area or anywhere else in the country (Paz, 1986; Shirihai, 1996).

Geographic areas of breeding within Israel. Breeding location was the Yeruham reservoir (30°59'N/34°53'E), a large man-made reservoir that contains water all year

round due to winter floods and sewage flow. The reservoir is located in the central Negev highlands, at an elevation of 440 m above sea level. It is one of the most elevated locations in which this species was recorded in Israel, and this comprises the first record of this species in the central and northern Negev (deduced from information in Shirihai, 1996).

Breeding time. An adult-sized purple gallinule chick was found on 22 October 2002 (pers. obs.; I. Tsurim, pers. comm.). It is thus likely that breeding started in the lake much earlier, given the species' incubation period of 23–25 days and fledgling period of 60–63 days (Snow and Perrins, 1998). Therefore breeding probably started no later than the end of July 2002.

Habitat characteristics and nest microhabitat. Yeruham reservoir is a large water body (1.5 km²), with lush reedbeds and tamarisk groves surrounding its shores. The reservoir and the park adjacent to it are situated within a desert of scattered low bushes, typical of the central Negev highlands. The lake and park form an oasis that has been known for many years to host breeding populations of water birds (Shirihai, 1996). Among the more common breeding species like the little grebe (*Tachybaptus ruficollis*) and the moorhen (*Gallinula chloropus*), more unusual breeding species include the mallard (*Anas platyrhynchos*), found breeding there in May 1998 and June 1999 (pers. obs.), with the reservoir being the southernmost breeding location of this species in Israel (see Shirihai, 1996); and the coot, a rather rare breeding species in Israel, whose largest breeding population of about 15 pairs is found at this lake (Shirihai, 1996; pers. obs. in 1998–9). The exact purple gallinule nesting site is unknown and was probably in the extensive reedbeds found along the southern and eastern shores of the reservoir, including several islands on the lake's eastern side, where the purple gallinules were first located.

General findings of breeding biology. On 22 October 2002 two purple gallinules, one adult and one full-grown chick, were found on a small island covered with reeds, in the eastern part of Yeruham reservoir (pers. obs.; I. Tsurim, pers. comm.). According to the adult plumage characteristics, birds were assigned to *P. p. madagascariensis*, the more common subspecies in Israel (Shirihai, 1996). Although fully grown in size, the chick's age was determined by the dullness of its plumage colors and especially by the colors of its bare parts (light pinkish legs and dark, almost black, bill). The adult was observed feeding the young in shallow water, using its long legs and toes to transfer the tender parts of plants taken from the undersurface. Snow and Perrins (1998) reported that the age of independence following fledging is quite extended, 42–56 days. Therefore, the latest possible date of egg laying, given incubation and fledging period of 83 days (Snow and Perrins, 1998), is 1 July and the earliest possible date, given incubation and fledgling period of 88 days and 56 days to independence (Snow and Perrins, 1998), is 30 April. Snow and Perrins (1998) reported that in northwest Africa eggs were laid from the end of March to June and in southern Spain, from the end of January through February, with the main hatching period in March (both of subspecies *P. p. porphyrio*). The species usually produces one brood, but two broods are possible, with a clutch size of usually 2–7 (Snow and Perrins, 1998). Subsequent observations on the site included two adult

birds and a fully-grown chick on 29 October (Y. Perlman, pers. comm.), three adults on 14 November (J. P. Smith, pers. comm.), and an adult and a chick on 30 November (R. Ram, pers. comm.).

3. PAINTED SNIPE *Rostratula benghalensis* (L. 1758)

Subspecies in Israel. R. b. benghalensis.

Global breeding range. Central, southern, and northeastern Africa, southern Asia, and Australia (Snow and Perrins, 1998).

East Mediterranean breeding range. Resident in Egypt, including the Nile Delta and the Suez Canal area (Goodman and Meininger, 1989; Snow and Perrins, 1998).

Status in Israel. Rare irregular visitor, mainly during spring and summer, chiefly to wetlands of western and northern Israel (Paz, 1986; Shirihai, 1996).

Breeding status in Israel. Although the species was suspected to breed in the past, (e.g., a pair seen in courtship behavior at the Or Akiva sewage ponds during spring 1979; Paz, 1986; Shirihai, 1996), there was no definitive proof of breeding until 1995, when R. Ram and G. Gilboa discovered female, a male, and fledgling painted snipes in the Sharon area, central coastal plain.

Geographic areas of breeding within Israel. Breeding location was “Brechat Ya’ar” (32°24’N/34°53’E), a natural winter pool, 0.7 km² in area, that usually retains water up to the end of spring. The pool is in the Sharon area, 20 km south of Ma’agan-Mikhael and the Carmel coastal plain, where many of the species’ previous records in the country occur (according to 1979–1990 records given in Shirihai, 1996).

Breeding time. Although painted snipes were found on the site throughout August and September 1995, only on 23 September was breeding proven, when a male was found rearing two almost adult-sized fledglings. It is therefore reasonable to assume that given the species’ incubation period of 19 days (Snow and Perrins, 1998) and the estimated age of the young of about one month (E. Dovrat, pers. comm.), the painted snipes had laid their eggs in Brechat Ya’ar no later than the beginning of August 1995. There are no data in the literature on fledging period or length of period needed to independence after fledging. According to Snow and Perrins (1998), painted snipes in Egypt laid their eggs in April–May.

Habitat characteristics and nest microhabitat. Brechat Ya’ar is a small temporary pool (0.7 km² in area), in an area where large swamps were once found, until their drainage at the end of the 19th and beginning of the 20th century. Quite exceptionally, during the summer of 1995, the pool held water due to a leak from a nearby pipe. Although exact nest location was unknown, the painted snipes favored a certain, rather small, area at the pool’s southern part, characterized by the presence of approximately 30-cm-high tree trunks set within low grass. The nesting location is known from Egypt to be on the ground among thick marshy vegetation (Snow and Perrins, 1998).

General findings of breeding biology. On 23 September 1995 one male rearing two fledglings, and four females, were found at the site (E. Dovrat, pers. comm.) after several individuals had been seen at this pool from the beginning of August 1995 (R. Ram, pers. comm.). The clutch size reported in Snow and Perrins (1998) is normally 4, but 2 and 3 eggs have also been recorded. The male and two fledglings were not seen at the site later on, though the females remained there throughout the autumn, e.g., two females were seen there in mid-November (E. Dovrat, pers. comm.).

4. THICK-BILLED LARK *Rhamphocoris clotbey* (BONAPARTE 1850)

Subspecies in Israel. Monotypic species.

Global breeding range. North Africa and southern Middle East. More abundant in northwest Africa, i.e. Morocco (Snow and Perrins, 1998).

East Mediterranean breeding range. Breeds occasionally in Egypt (first breeding record in 1995), regular breeder in central Jordan (southern Syrian Desert), and northern parts of Saudi Arabia. Recorded on passage throughout breeding range and in Sinai, Israel, and central and southern Arabia (Snow and Perrins, 1998).

Status in Israel. Very rare and irregular migrant, possibly also wintering, with only 17 records during 1960–1989 (Shirihai, 1996). In all cases observed only for brief periods, on ground or during active flight, presumably before continuing on passage. Conversely, during spring 1994 up to six birds were observed for many days, some exhibiting territorial behaviors, in a sandy area 20 km north of Elat. These birds left suddenly, probably due to disturbance (agricultural activity) at the site (Shirihai, 1996).

Breeding status in Israel. Never previously reported to breed in Israel, though breeds regularly in Jordan (Andrews, 1995).

Geographic areas of breeding within Israel. The breeding of the thick-billed larks took place near the Egyptian border, some 45 km north-northwest of Elat (29°52N'/34°48'E). This area is used by the Israeli army for training, but many parts of it are still pristinely preserved. All previous records of the species in Israel were within 60 km of this area, though not a single one from within it (probably because the area is unpopulated by humans).

Breeding time. Thick-billed larks were first seen in this area on 6 March 1999, when a flock of 17 birds was seen in flight, crossing the Egyptian border into Israel (S.B. Lerman and J.P. Smith, pers. comm.). A subsequent observation was on 4 April 1999 when 45 individuals were seen flying across the border from Israel into Egypt (pers. obs.). This was the largest flock ever to be recorded in Israel (cf. Shirihai, 1996). On 18 April birds were first seen on the ground, when three birds were observed on a hammada plateau and in a nearby dry water course some 700 m from the Egyptian border, 6.3 km north-northwest of the Sayarim Junction (B. Granit, pers. comm.). On 21 April, 23 individuals were located in an area of only 2.5 km.² One bird was seen taking plant material (small twigs) in its beak, and then flying towards a location where the first nest

was subsequently found. The nest was located on 29 April, with a female sitting in it. During 7–8 May, another pair was seen building a nest, about 1.5 km north of the first pair's nest. On 12 May, hatchlings, estimated to be one day old, were found in the first nest; thus incubation was estimated to take 13 days. The young left the nest on 21 May, but apparently were not able to fly at this stage. On that date, the second pair's nest still contained eggs. On 23 and 24 May two fledglings exhibiting begging behavior were located in the area of the first nest. On 28 May a third breeding pair was found, about 1 km south of the first pair's nest. This pair was seen feeding a young, estimated to be 3 days outside its nest. On the same day, the second pair's nest was found to contain hatchlings. On 29 May, a fourth pair was found ca. 1 km east of the second pair's nest. The pair was found feeding hatchlings about one week old. The second pair's hatchlings were seen in the nest at least until 2 June, when observations in the area ceased. To summarize, based mainly on observations of the first pair, nest building took about 8 days, incubation period 13 days, fledgling period in the first pair's nest 10 days (the second pair's hatchlings were at least 6 days old when still seen in nest), and fledglings were fed after leaving their nest for at least 3 more days. Breeding season in northwest Africa is from late March to late May, sometimes, exceptionally, in February or even January. In Jordan, a nest was found in late April (Snow and Perrins, 1998). Thus, the breeding timing of the Israeli birds was similar to those of both Jordanian and northwest African birds.

Habitat characteristics and nest microhabitat. The area is characterized by completely bare low stony hammada hills and plains, of extremely arid habitat, with sparse low shrubs (dominated by *Artemisia herba-alba*, *Stipa capensis*, and *Anastatica hierochuntica*) in the shallow, dry water courses. Several wide and shallow plateaus feature between the low hills. This matches the habitat characteristics of the species elsewhere, as given by Snow and Perrins (1998). During the preceding winter and especially earlier during the spring of 1999, intensive rains generated local floods in the area, and some puddles remained for several weeks afterwards (pers. obs.). During March and April 1999, the local annual vegetation subsequently responded with lush growth. Besides thick-billed larks, many other bird species inhabited the area, which at other times is very sparsely populated by birds (pers. obs.). Most notable were the many Temminck's horned larks (*Eremophila bilopha*) that nested in the area and in adjacent areas, with a total of no less than 50 pairs (pers. obs.). Other lark species (e.g., lesser short-toed lark *Calandrella rufescens* and bar-tailed lark *Ammomanes cincturus*), trumpeter finches (*Bucanetes githagineus*), and sandgrouses (*Pterocles* sp.) were also common there at that time, but not during the subsequent years of low precipitation levels (pers. obs.). At Azrak (Jordan), the species was found sharing a habitat with Temminck's horned lark, lesser short-toed lark, hoopoe lark (*Alaemon alaudipes*), and crested lark (*Galerida cristata*) (Snow and Perrins, 1998). The birds in Israel were observed over a total area of 4 km², within 2 km from the Israeli–Egyptian border, at a distance of 5 to 9 km north-northwest of Sayarim Junction. The first nest was located on the north-facing side of a low hill (2–3 m above adjacent dry water courses), completely bare of any vegetation and covered with small stones. The nest was a cup-like basket, woven from shrubs and

straw and located in a shallow depression in the ground, 9.5 cm internal diameter and 4.5 cm internal depth. About three-quarters of the nest's perimeter was surrounded by flat stones 2×2 to 4×4 cm in size, creating a 14-cm-long (from the nest basket outwards) and 30-cm-wide (from side to side) flat platform-like area around the nest. The second nest was located beneath a very low shrub, 10 cm in height. The third nest (of the fourth pair) was located adjacent to a $20 \times 20 \times 20$ cm stone. Here too, a flat platform was found in front of the nest, this time made of flat stones of up to 5×5 cm. The nests were oriented towards the north, thus shaded, at least to some extent, at midday (B. Granit, pers. comm.).

General findings of breeding biology. For incubation and fledging periods, see above. There are no comparative data on this species from elsewhere. However, other species of large larks tend to have similar incubation and fledging periods (e.g., bimaculated lark *Melanocorypha bimaculata*), typically characterized by a short fledging period, with young leaving their nest before they are able to fly (Snow and Perrins, 1998). Both male and female were seen building their nest (second pair). Only the female was seen sitting on eggs (first pair), but the observations on egg incubation were too brief to rule out the possibility that the male also participated. Clutch sizes were 3 in two pairs and an additional pair was found brooding 3 fledglings (clutch size is normally 3–5 according to Snow and Perrins, 1998). Eggs were pinkish colored, finely spotted brown. In one case the female was seen sitting on its several-day-old hatchlings during early morning hours. Both males and females were seen feeding their young, but in the first pair only the female fed its 1-day-old brood, with the male joining the feeding effort when the hatchlings were older (B. Granit, pers. comm.). Adults were seen several times feeding their young with large locusts, after tearing off the insects' legs, wings, and the outer chitin skeleton. The locusts were 4–5 cm long and 1–1.5 cm in diameter when given to the young and were swallowed in one piece. Similar observations from northwest Africa are reported in Snow and Perrins (1998). Breeding dispersion was rather dense, with 4 pairs occupying an area of about 4 km^2 (1 pair/ km^2), and a minimum distance between nests of about 900 m. Snow and Perrins (1998) reported that breeding pairs in south Algeria on the central Sahara were highly scattered, with about one pair per 10 km. It is worth noting that the thick-billed larks probably settled in the area as a consequence of the high precipitation levels that had caused a marked growth of annual vegetation and arthropod abundance. Other bird species, and especially Temminck's horned lark, seem to have responded in a similar way and bred in large numbers in the area (pers. obs.).

5. WALLCREEPER *Tichodroma muraria* (L. 1758)

Subspecies in Israel. T. m. muraria.

Global breeding range. Southern Europe and southern parts of central and western Asia (Snow and Perrins, 1998).

East Mediterranean breeding range. Breeds in Turkey and Iran. During winter, recorded regularly also in Cyprus, Israel, and Jordan (Snow and Perrins, 1998).

Status in Israel. Very rare to rare winter visitor, mainly in mountainous regions of northern Israel, fewer in the center of the country (Shirihai, 1996), and only one recent record in southern Israel. There is not a single record of this species in Israel between mid-April and mid-November.

Breeding status in Israel. The species was suggested to breed in Lebanon (Benson, 1970) and also in cliffs of the Galilee and on Mt. Hermon during the 19th century and first half of the 20th century, but evidence was lacking (Shirihai, 1996; Snow and Perrins, 1998) until the 1997 finding of a recently fledged bird on Mt. Hermon (D. Alon, pers. comm.).

Geographic areas of breeding within Israel. Breeding location was on Mt. Hermon. Although exact nest location is unknown, as the observation involved a fledged individual, the area where this bird was observed (33°18'N/35°46'E) is at an elevation of 1,800 m above sea level.

Breeding time. The date of the sighting was 16 June 1997 (D. Alon, pers. comm.). Given the species' incubation time of 18.5–20 days, fledging time of 29 days, and time of independence after fledging of 5–6 days (Snow and Perrins, 1998), it is likely that breeding started in the middle to the end of April 1997. Breeding season in this species is weather and elevation dependent, with fledglings found leaving their nest between the end of June and the beginning of August (Snow and Perrins, 1998). Thus the Hermon bird, found south of its known distribution range, at a rather low elevation, fledged somewhat earlier than dates given for birds in Europe.

Habitat characteristics and nest microhabitat. Mt. Hermon, peaking at 2814 m above sea level, is characterized by an altitudinal zonation of vegetation communities, as a consequence of different climatic conditions at each elevation. The area where the fledged individual was seen is characterized by a sparse broad-leaved wood (dominated by *Quercus look*, *Q. boissieri*, and *Styrax officinalis*) with some shrubby undergrowth (e.g., *Dactylis glomerata* and *Hordeum bulbosum*), on steep slopes covered with large boulders. One hundred meters further upslope, the trees are completely replaced by small bushes. Some cliffs are also found nearby. Thus, wallcreepers can find a suitable nesting location in the area, as their nesting sites are known to be clefts in the rock face or heaps of boulders or scree, inaccessible to human and terrestrial predators (Snow and Perrins, 1998).

General findings of breeding biology. A recently fledged wallcreeper, according to the absence of pink color in its plumage and its short and rather straight bill, was observed near the lower cable car station water ponds at Mt. Hermon (D. Alon, pers. comm.). The bird approached the pool and was immediately harassed by the local northern wheatears (*Oenanthe oenanthe*). It subsequently moved away from the pond and was not relocated. It seems improbable that this recently fledged bird could have arrived from a distant location outside the Hermon boundaries, but the exact nesting site remains unknown. In any case, even if the bird had come from another part of the

Hermon, this would still be a major range expansion towards the south, based on its breeding distribution given in Snow and Perrins (1998).

6. COMMON MYNAH *Acridotheres tristis* (L. 1766)

Subspecies in Israel: polytypic; *A. t. tristis* and *A. t. tristoides* are believed to be the introduced forms in the area (Snow and Perrins, 1998).

Global breeding range. South-central and southeastern Asia (between Iran–Kazakhstan and Burma), introduced in France, Canary Islands, Georgia, Arabia, South Africa, Madagascar, Australia, New Zealand, and islands in Indian and Pacific oceans (Sibley and Monroe, 1990; Snow and Perrins, 1998).

East Mediterranean breeding range. Breeds in Arabia and Gulf States including Kuwait, Turkey (mainly along the eastern part of Black Sea coast; Boyla and Eken, 1998; Snow and Perrins, 1998; Kirwan and Martins, 2000), Iraq (Salim, 1998), and Egypt (Millington, 2000). Recorded lately also from Lebanon (Bara, 2002).

Status in Israel. Introduced species that has increased in numbers in recent years. Found mainly in the Greater Tel Aviv area of central Israel, but also in some more southerly locations such as Ashkelon and Be'er Sheva (Sapir, 2000).

Breeding status in Israel. The species was virtually absent from Israel until the end of the 1990s when, probably due to escape and/or release of birds, it became abundant in certain areas in central Israel, mainly in man-made habitats such as city parks (prominent in the Yarkon Park, Tel Aviv).

Geographic areas of breeding within Israel. Breeding locations in central Israel include the Yarkon Park in the city of Tel Aviv (32°05'N/34°47'E), Mikve Yisrael (32°02'N/34°47'E) near Holon, and probably many other parks where the mynahs occur. In Be'er Sheva (31°15'N/34°49'E), birds were seen feeding young in summer 2001 (N. Hasson, pers. comm.).

Breeding time. In June 2000 a pair of common mynahs was seen carrying nest material and entering a nest cavity in a palm tree at the Yarkon Park in Tel Aviv (pers. obs.). In Mikve Yisrael, amongst several mynahs, an adult bird feeding a fledgling was observed in July 2000 (R. Mizrahi, pers. comm.). The same was also seen in Be'er Sheva in July 2001 (N. Hasson, pers. comm.). Breeding period is thus probably between May and August, given the species' incubation period of 13–18 days and fledgling period of 22–35 days (Snow and Perrins, 1998). However, breeding, incubation, and fledgling periods have not yet been studied in Israel. Snow and Perrins (1998) reported that the breeding season is highly variable, according to habitat conditions often associated with human activity. In Central Asia, where natural populations breed, the breeding season is between May and August. Thus the breeding mynahs in Israel show similar breeding timing to that of the Central Asian birds.

Habitat characteristics and nest microhabitat. Common mynahs were found to be associated with the man-made environment of parks in urban areas. The birds were seen usually on the grass, or on various trees, notably on palm trees. This was observed in the Yarkon Park in Tel Aviv, in a palm grove in Ashkelon (A. Balaban, pers. comm.), and in two different locations in Be'er Sheva. This is in agreement with Snow and Perrins (1998) who reported that the species tends to be an opportunistic breeder, using man-modified habitats. In June 2000, a pair of common mynahs was seen entering a nest cavity in a date palm tree, at the Yarkon Park in Tel Aviv. The cavity was located ca. 3 m above ground, among the stems of chopped off palm leaves. Nesting sites are known to comprise different sorts of holes and crevices (Snow and Perrins, 1998).

General findings of breeding biology. Nest building was observed in one case in June; adults feeding young were seen in two cases during July. It is known that the species can raise several broods per breeding season and that pairs may nest in close proximity (Snow and Perrins, 1998), but there is no information on this or on other fundamental aspects of its breeding biology in Israel.

DISCUSSION

Six bird species, not previously known to breed in Israel, were found breeding in the country between 1995 and 2002. In all cases but that of the common mynah, the birds seem to be of natural origin (not introduced), generally exhibiting breeding habits known from elsewhere. These bird species were previously regarded as rare non-breeding visitors and their breeding may be occasional (e.g., thick-billed lark) or may represent the start of continual population establishment in the country (e.g., green-backed heron). Conversely, the common mynah, an introduced species not present in Israel before the end of the 1990s, seems to have substantially increased in numbers in recent years. This species was introduced mainly into the Tel Aviv area (Sapir, 2000), and is known to have been introduced into other localities in the Middle East.

Resembling the Israeli breeding avifauna, the reported species are of various zoogeographic affinities, including Cosmopolitan, Old World, Central Palearctic, Paleotropic, Oriental, and Palearctic deserts. However, when excluding the single introduced species and treating the species at their sub-specific level, it seems that only in one case (wallcreeper) does the local breeding event represent a southward extension of its breeding range, while in the other four cases the breeding incidents represent northward extensions. These latter extensions are from wetlands, probably of northeast Africa (purple gallinule and painted snipe), or from the Arabian and Saharan deserts (green-backed heron and thick-billed lark). It still remains to be seen in the future whether these breeding range extensions indicate some trend of northward expansion of certain bird populations (see Safrieli, 1995) or whether the zoogeographic affinities of this assemblage of species were determined by chance alone.

Israel has undergone large-scale man-induced alterations throughout the 19th and the

20th centuries, greatly affecting many bird populations in the country (Yom-Tov and Mendelsohn, 1988). Although deleterious to populations of many bird species, these changes have also enabled other bird species to expand their ranges by creating suitable habitats for their establishment (Yom-Tov and Mendelsohn, 1988). The present findings strikingly demonstrate that such man-made habitat alterations have enabled range extensions not only of certain bird species in Israel, but also of bird species not previously reported to breed in the country. The green-backed heron bred on artificial islands off the Gulf of Aqaba; the purple gallinule bred in a man-made reservoir in the middle of the desert; and painted snipes bred in an area where some wetlands still exist, but in a location where certain human-induced circumstances provided them with suitable conditions for breeding.

The common mynah represents an extreme example of the use of man-modified habitats. Not only was the species probably introduced into the wild through escapes and releases from zoos, but it also exhibits a strong dependency on man-made parks, mainly in very urbanized and populated areas. Common mynahs inhabiting city parks in the Tel Aviv area are a common sight these days (Sapir, 2000), but although the species seems to be increasing in numbers and expanding its distribution in Israel, little is known about many aspects of its biology, including its breeding biology and its influence on other bird species. It is known from elsewhere that mynah pairs can nest at high density and can produce several broods in a breeding season (Snow and Perrins, 1998). Thus, the species can rapidly increase its numbers and expand its range. Though current data suggest that they are limited to parks (Sapir, 2000), it is not clear whether the mynahs will also be able to breed in natural habitats throughout Israel. If this happens, the species is expected to compete for nesting sites (holes and crevices) with local species, like the Syrian woodpecker (*Dendrocopos syriacus*). Hence, the establishment of the common mynah in Israel may bear severe consequences for other bird species.

The breeding of the thick-billed lark in the southern Negev in spring 1999 seems to be typical for this species, which is known to respond to conditions in desert habitats associated with food availability (Snow and Perrins, 1998). The species wanders great distances in the Palearctic deserts and settles to breed wherever, and to some extent also whenever, local conditions meet its needs (Snow and Perrins, 1998). This phenomenon is not unique to this species, but is shared, to some degree, with other desert lark species, such as Temminck's horned lark, which bred side by side with the thick-billed larks in 1999. What is still unknown is why certain species, such as Dunn's lark (*Eremalauda dunnii*) and the black-crowned finch lark (*Eremopterix nigriceps*), which respond in a similar manner to local habitat conditions (Snow and Perrins, 1998), were not also present in the southern Negev. The nature of the climatic-induced breeding systems of these desert lark species should therefore be given more attention in order to enable prediction of the species' movements and breeding, based on climatic, habitat, and probably other factors.

Shirihai (1996) summarized information on 202 bird species found to breed at one time or another in Israel. Nathan et al. (1996) reported a total of 204 breeding bird species. Thus, by adding six more bird species, the number of species that comprise the

Israeli breeding avifauna is currently 210, including the apparently introduced common mynah. It will be of interest to examine the ongoing influence of human activities on the dynamics of the Israeli breeding avifauna in the future. Hopefully, no species will become extinct as a result of human actions. On the other hand, new breeding bird species may be found in the future to have settled in Israel and thus enrich its breeding avifauna.

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