

# Clues to the Migratory Routes of the Eastern Flyway of the Western Palearctics – Ringing Recoveries at Eilat, Israel [I – *Ciconiiformes*, *Charadriiformes*, *Coraciiformes*, and *Passeriformes*.]

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Eilat, located in front of (in autumn) or behind (in spring) the Sinai and Sahara desert crossings, is central to the biannual migration of Eurasian birds. A total of 113 birds of 21 species ringed in Europe were recovered either at Eilat (44 birds of 12 species) or were ringed in Eilat and recovered outside Israel (69 birds of 16 species). The most common species recovered are Lesser Whitethroat (*Sylvia curruca*), White Stork (*Ciconia ciconia*), Chiffchaff (*Phylloscopus collybita*), Swallow (*Hirundo rustica*) Blackcap (*S. atricapilla*), Pied Wagtail (*Motacilla alba*) and Sand Martin (*Riparia riparia*). The importance of Eilat as a central point on the migratory route is substantiated by the fact that although the number of ringing stations in eastern Europe and Africa are limited, and non-existent in Asia, several tens of birds have been recovered in the past four decades. This also stresses the importance of taking a continental perspective to future conservation efforts.

Key words: ringing, recoveries, Eilat, Eurasia, Africa.

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## 1. Introduction

Israel is the only land bridge between three continents and a junction for birds migrating south between Europe and Asia to Africa in autumn and north to their breeding grounds in spring (Yom-Tov 1988). About 280 species migrate over Israel, and the Old World's largest ever recorded raptor migration occurred at Eilat, Israel during the spring of 1988 when almost one-million two hundred thousand raptors were counted (Shirihai and Christie 1992). This is not a freak occurrence and not only soaring birds use this route. Millions of waders, waterfowl, passerines and pelagic migrants choose to use this route to reach their breeding grounds.

Eilat is located at the southern end of the Arava Valley, which forms part of the rift valley, a tectonic depression extending from Anatolia to central Africa (Safriel 1968). The mountains on both sides of the valley in this region are mostly of magmatic rocks, attain heights of about 700 m above sea Level (ASL) and on the Jordanian side about 1,200 m ASL. The mountains are cut by many 'wadis', and many form large alluvial fans.

Eilat is situated on the northern edge of the Saharan-Arabian desert belt, at the edge of almost 2000 km of continuous desert regions of the Sahara and Sinai deserts. However, to the north-north-east there are still 650 km more of the Syrian Desert, and due East the vast Arabian desert (Fig. 1). Hence many birds land here to rest before (in autumn) or after (in spring) crossing the desert (Yom-Tov 1988). The return of those that have survived the autumn migration and overwintering in Africa is directed north or north-east, in the shortest route to their Palearctic (estimated 46 % of migrants) and Holarctic (14 %) breeding grounds. Many follow the north-westerly coastline of the Red Sea until they reach its northern tip, where Eilat is located, and then fan out to the north and north-east (Yom-Tov 1988). This explains why large concentrations of soaring birds are seen at Eilat in the diurnal hours (Yom-Tov 1988), and waders, waterfowl and passerines can be tracked by radar at night (Bruderer 1994).

Many of the migrants are found in high densities in man-made green areas such as recreational areas, agricultural fields, in reed (*Phragmites* spp.) beds along drainage canals and sewage treatment installations. The known geographical distribution of these species is not well known as opposed to the well studied migration routes of Western Europe – mostly those converging on the western (Gibraltar) and central (Straits of Bon) flyways. This can be attributed to the higher densities of ringing stations and longer period of interest in the study of migrations. Conversely, very little is known about the Eastern Palearctic flyway. This is mainly due to the fact that political instability has the attention of most peoples of the region and scientific studies have not been a priority. This is evident in that in all of the Middle East there is only one ringing station – that run by the International Birding Center in Eilat (IBCE) that has consistently ringed birds since 1984. The closest ringing station is in Central Europe to the north and in Kenya in Africa – leaving over 3000 km with no monitoring or study of the avian migrations.

Although IBCE has conducted regular ringing since 1984, it has been irregular in its consistency of daily net-hours, numbers of nets used, and periods of ringing. This data is now computerized and copies are stored at the Israeli Bird Ringing Center (IBRC) and the IBCE. In addition to this ringing program, extensive ringing occurred in Eilat in the 1950s and 1970s, however, none of the data was ever deposited at the IBRC and remains inaccessible to date (Y. Langer, pers. comm.). Consequently, many recoveries remain unresolved and the data unanalyzed. And yet, although there are so many handicaps to working the only ringing station in the central section of the Eastern flyway of the Western Palearctics, a surprisingly large number of rings have been recovered either outside Israel, or in Eilat of birds ringed in Central and Western Europe.

## 2. Methods

I collated all data relating to the ringing program in Eilat. This included all previous records of recoveries reported but not recorded in the IBCE or IBRC offices. The IBCE data were checked against lists supplied by the IBRC (Y. Langer, Pers. comm., Raviv 1995) to clarify misprinted or misplaced data. The data was also compared to the extensive maps and data collated by the Vogelwarte Radolfzell and the Max-Planck-Institute for Verhaltensphysiologie Vogelzug-Verlag Moegglingen (Zink 1973, 1975, 1981) „Longevity list of birds ringed in Europe“ (R. Staav, Internal Publ., Swedish Bird Ringing Centre, 25. 3. 1995) to evaluate the longevity of the birds recovered on the eastern flyway. Birds recaptured after their initial ringing were described as RETURN if recaptured in a subsequent season, RECOVERY as one caught away from Eilat, and CONTROL as any bird caught at Eilat and ringed elsewhere. Data are presented as means  $\pm$  SD unless otherwise specified.

## 3. Results

A total of 113 birds of 21 species ringed in Europe were recovered either at Eilat (44 birds of 12 species) or were ringed in Eilat and recovered outside Israel (69 birds of 16 species). The most common species recovered are Lesser Whitethroat (*Sylvia curruca*; 19, 16.8 %), White Stork (*Ciconia ciconia*; 14, 12.4 %), Chiffchaff (*Phylloscopus collybita*; 13, 11.5 %), Swallow (*Hirundo rustica*) and Blackcap (*S. atricapilla*; 9, 8.0 %), White Wagtail (*Motacilla alba*) and Sand Martin (*Riparia riparia*; 8, 7.1 %).

All **White Storks** controlled in the fields around Eilat were ringed in Western and Central Europe (Fig. 1). The birds had travelled an average of  $2740 \pm 510$  km from where they were ringed, and most appear to be first year birds. The maximum time between ringing and recovery was 3 years and 4 months, as compared to 39 years in Staav (1995). This data concurs with Shirihihi (1996) who stated that „most of the West Palearctic population, from northwest Europe east of 5° E, down to the Alps, and eastwards to 45° E in West Russia, passes through Israel.“

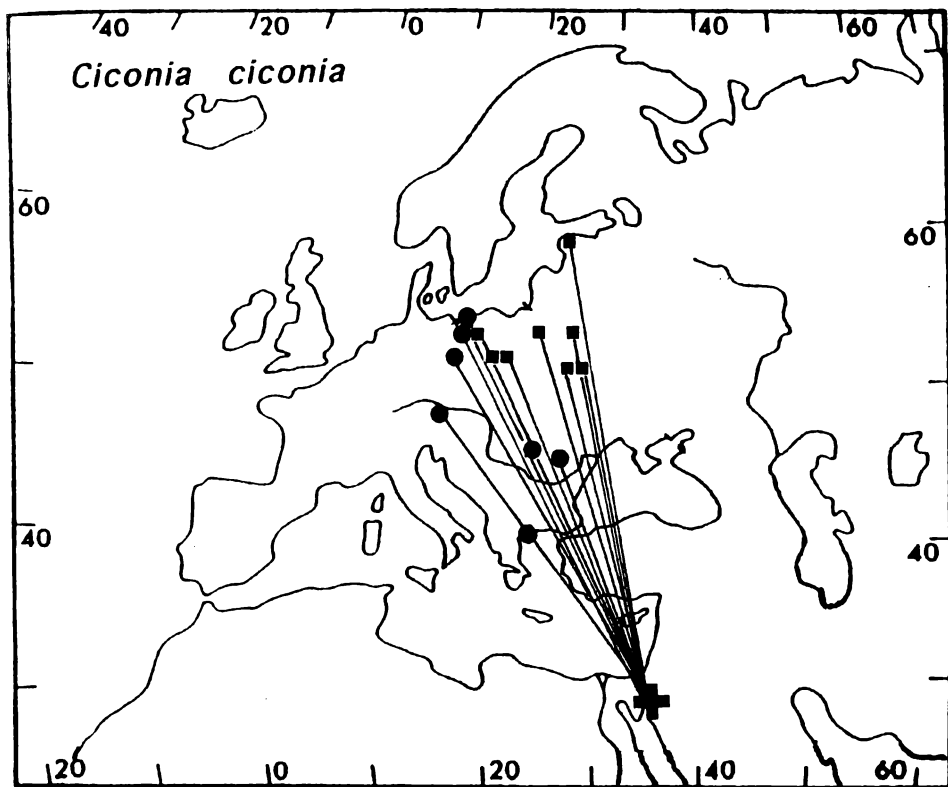


Figure 1. Recoveries of White Stork (*Ciconia ciconia*) at Eilat and ringed in Central and Western Europe. Squares denote recoveries, and filled-in circles the Controls.

Abb. 1. Wiederfunde des Weißstorchs (*Ciconia ciconia*) in Eilat, Beringung in Mittel- und Westeuropa. Quadrate bezeichnen Wiederfunde, ausgefüllte Kreise kontrollierte Vögel.

The only **Black Stork** (*Ciconia nigra*) controlled in Eilat (distance 3064 km) was ringed 56 days before as a nestling in Riga, Latvia.

The three **Quail** (*Coturnix coturnix*) were recovered to the north of Israel, from the Steppe regions of the Ukraine and Russia (average distance  $1657 \pm 42$  km). A fourth individual was recovered from their transition area in the Western Desert of Egypt. However, the fact that it was recovered in November may suggest that some of the population might winter in the desert. The maximum time between ringing and recovery was 2 years and 7 months.

Only two waders have been recovered from the hundreds ringed. A **Greenshank** (*Tringa nebularia*) was recovered in Western Russia, 1 year and 2 months after it was ringed in Eilat. A **Green Sandpiper** (*T. ochropus*) was recovered in the Ukraine 5 months after ringing. The longevity record for the latter species is 11 years 2 months (Staav 1995).

Very few gulls have been ringed in Eilat, however, two **Lesser Black-backed Gulls** (*Larus fuscus*) ringed in Finland (average distance  $3595 \pm 135$  km) were controlled. The maximum time between ringing and recovery was 22 years which is close to the 28 years 11 months reported by Staav (1995).

A **Common Tern** (*Sterna hirundo*) ringed in western Russia was controlled after 4 years and 11 months. This is known to be a long-lived species and Staav (1995) reports a record of 30 years and 10 months.

Five of the six **Turtle Dove** (*Streptopelia turtur*) were recovered north of Israel, in Russia, Ukraine, and Turkey, and one in the Dinder National Park, Sudan. The latter was recovered after 4 years and 5 months.

The three **European Bee-eater** (*Merops apiaster*) ringed in Eilat were recovered in Cyprus and Greece within a few months, having travelled a comparatively short distance of several hundred kilometers. These regions are within the known breeding range of this species (Shirihai 1996).

Most of the **Sand Martin** controlled are from Eastern Europe (Hungary, Estonia, Lithuania, Russia; Fig. 2). However, a bird ringed in Eilat was also recovered in Finland. The average distance between the points of ringing and recovery is  $2949 \pm 670$  km, and the maximum time between rin-

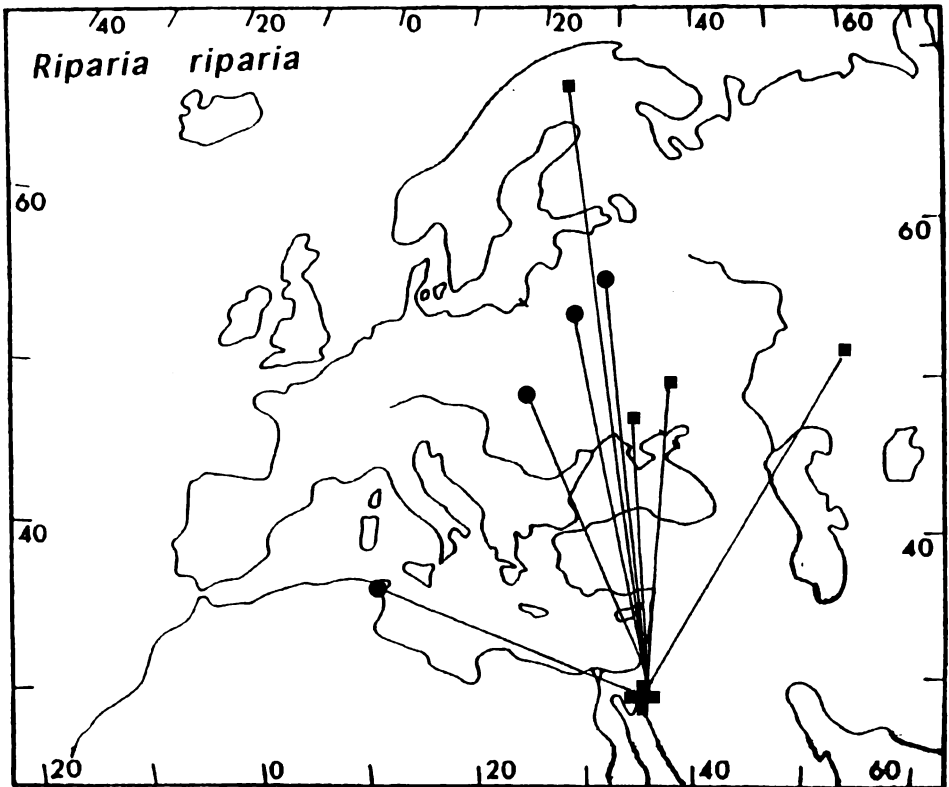


Figure 2. Recoveries of Sand Martin (*Riparia riparia*) ringed or recovered in Eilat and Central Europe. Note recovery at Eilat of individual one year after it was ringed in Tunisia, on the Central Palearctic Flyway. Squares denote recoveries, and filled-in circles the Controls.

Abb. 2. Wiederfunde der Uferschwalbe (*Riparia riparia*), beringt oder wiedergefunden in Eilat und Mitteleuropa. Bemerkenswert ist der Wiederfund eines Vogels in Eilat ein Jahr nach seiner Beringung in Tunesien auf dem zentralpaläarktischen Flugweg. Quadrate bezeichnen Wiederfunde, ausgefüllte Kreise kontrollierte Vögel.

ging and recovery was 2 years. One of the most important controls is that of a Sand Martin ringed in Tunisia on 19 May 1968 and recovered in Eilat exactly two years later, on 18 May 1970, proves that at least a proportion of any given population are versatile in their choice of the migratory route between years.

The **Swallow**, considered one of the commonest hirundine of the region (Shirihai 1996), have been recovered in, and controlled from, many directions. To the north, birds ringed in Eilat have been recovered from the Sura River in Russia to the east, to Sweden in the west. To the south, a bird was recovered on their wintering grounds in Botswana (Fig. 3). The birds recovered farthest to the north were 3280 kms from Eilat and the bird in Botswana 5580 km, suggesting a total annual migration of about 17,700 km for at least a part of the population. Similar to the interesting control of the Sand Martin from Tunisia, a Swallow ringed in Eilat on 1 May 1989 was recovered a year and

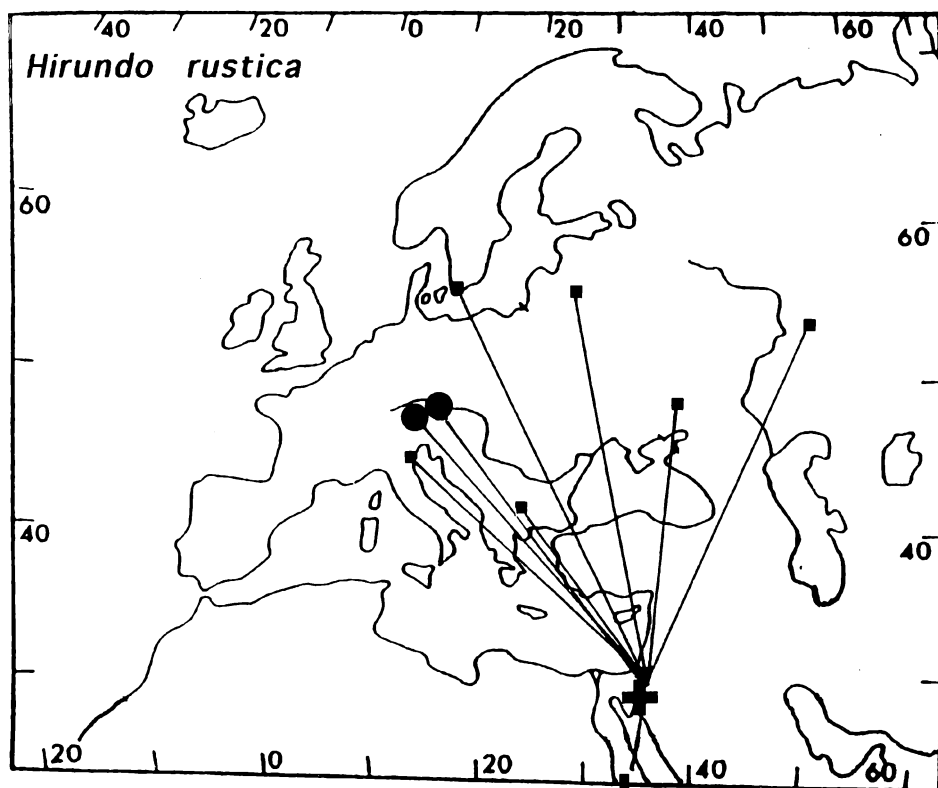


Figure 3. Recoveries of Swallow (*Hirundo rustica*) ringed in Eilat or in Slovenia. Note recovery on Central Palearctic Flyway (Italy) one year after ringing in Eilat. Squares denote reco-veries, and filled-in circles the Controls. The individual recovered in Africa was in Botswana (20.12 S, 23.45 E).

Abb. 3. Wiederrunde der Rauchschnalbe (*Hirundo rustica*), Beringung in Eilat oder Slowenien. Bemerkenswert ist der Wiederrund auf dem zentralpaläarktischen Flugweg (Italien) ein Jahr nach der Beringung in Eilat. Quadrate bezeichnen Wiederrunde, ausgefüllte Kreise kontrollierte Vögel. Der in Afrika wiederrundene Vogel war in Botswana (20.12 S, 23.45 O).

two weeks later in Italy while on migration. This strengthens the argument for the connection and relationships that the central and the eastern Western Palearctic flyways share. It appears that the avian populations of Western, Central, and Eastern Europe, and Western Asia are able to choose between the different flyways depending on a range of parameters (food-resource availability, weather, etc.) that are as yet not understood completely by us. The maximum time between ringing and recovery was 1 year and 9 months.

**White Wagtail** were recovered across the breadth of Northern Europe (Norway) and from as far south as Bulgaria, at distances of  $3202 \pm 743$  km from Eilat. The maximum time between ringing and recovery was an astonishing 20 years and 3 months!! of a bird recovered in Russia. Although the recovery form has been checked several times, I consider it reasonable to assume that this data needs to be considered with caution and that there may have been a time-lag between when the bird was truly recovered and when it was officially reported to the offices of the Russian Ringing Scheme. One bird from Lithuania was controlled.

Only two **Yellow Wagtail** (*M. flava*) have so far been recovered – one in Lebanon and the other in Bulgaria, after 1 year and 5 months. It is of interest to note that a Pied and a Yellow Wagtail ringed in Eilat on the same day (6 April 1983) were also recovered on the same day (18 August 1984), and at the same location in Bulgaria (although the recovery locations are named differently, they report the same geographical coordinates). All of the ringing recoveries reported by Zink (1975) show that the West European populations of the Pied and Yellow wagtails migrate on the western most flyway, at the Straits of Gibraltar, or use the Italian flyway. None are reported for the Israeli flyway.

So far only one **Nightingale** (*Luscinia megarhynchos*) has been controlled. It was ringed in Cyprus while on autumn migration and recovered in Eilat the following spring. Zink (1973) reported the majority of the recoveries and controls of central and western European birds were on the Gibraltar flyway, and a few through Italy and the Straits of Bon. Conversely, in the spring of 1970, a **Redstart** (*Phoenicurus phoenicurus*) ringed in Eilat was recovered 14 days later in Cyprus.

Three **Reed Warblers** (*A. scirpaceus*) ringed in Eilat were recovered in Central Europe, and a fourth ringed in Budapest was controlled in Eilat. They were recovered at an average distance of  $2285 \pm 332$  km. Maximum time between ringing and recovery was 2 years and 5 months. Zink (1973) reported that most west European birds were recovered along the Gibraltar flyway, with a few of the east European birds on the eastern Mediterranean-Israeli flyway. This lack of data can be attributed to the fact that in all of the Middle East and the Levant, only in Eilat is this ringing station active during the migratory seasons.

**Sedge Warblers** (*Acrocephalus schoenobaenus*) are ringed in large numbers at Eilat but to date we have had only one recovery from the Czech Republic. Most central and western European birds recovered either on the Gibraltar or the Italian flyways (Zink 1973). No record in Staaav (1995), maximum time between ringing and recovery was 5 years and 2 months).

Nineteen of the 20 recoveries or controls of **Lesser Whitethroat** are from Western Europe (Fig. 4). Three were recovered in Germany, and one each in Slovakia, Czech Republic, Norway, Denmark and Sweden. Conversely, birds were controlled from England (4), Germany (2), and one each from Norway, Sweden, and Finland. The only recovery to the south is from Egypt. This suggests that a large proportion of the West European population return to their breeding grounds by first migrating east to the Levant, through Israel, and then north in spring. The average distance of recovery is  $3389 \pm 357$  km. These data concur with Zink (1973) who found that all of the European Lesser Whitethroat were recovered or controlled either in Israel or in Egypt. Shirihi (1996) suggested that the fact that most recoveries in Israel are in spring „is probably a result of a more easterly route in spring of populations that in autumn migrate west of Israel, i. e., a circular migration route of birds that tend to circumvent east Mediterranean on spring migration.“

**Blackcap**, on the other hand, were recovered mostly in the Levant (5 of 9) and were probably still enroute to their breeding grounds. This is substantiated by the fact that others were recovered

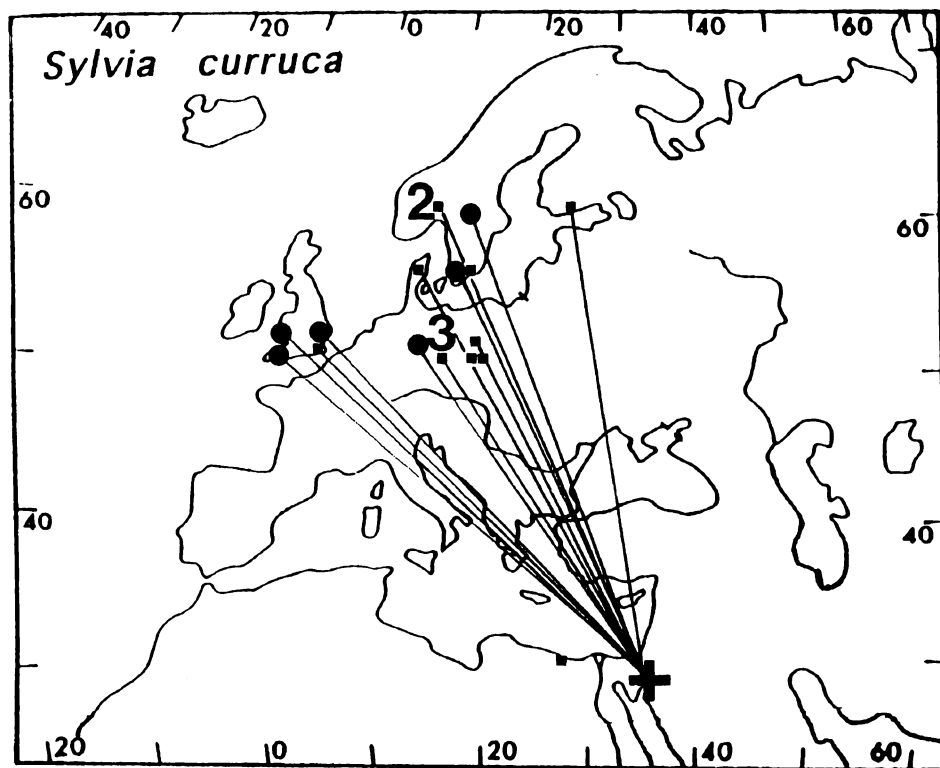


Figure 4. Recoveries of Lesser Whitethroat (*Sylvia curruca*) ringed or recovered in Eilat and Central Europe. Squares denote recoveries, and stars Controls.

Abb. 4. Wiederfunde der Klappergrasmücke (*Sylvia curruca*), Beringung oder Wiederfund in Eilat und Mitteleuropa. Quadrate bezeichnen Wiederfunde, ausgefüllte Kreise bezeichnen kontrollierte Vögel.

from as far as Sweden in the west or the Moscow region in Russia in the east i. e., an average distance of  $1443 \pm 1058$  km (Fig. 5). Maximum time between ringing and recovery was 4 years. Controls were from Russia and Bulgaria. Suggests similar migratory routes, behaviour, and pattern as that of Lesser Whitethroat (Shirihai 1996). These data are substantiated by Zink (1973) who reported that most west European birds migrated through Gibraltar, and a few through Italy. However, the north and east European birds were recovered or ringed in either Cyprus or Israel, as were also a few of the west European Blackcaps.

Six of 13 **Chiffchaff** were either ringed in Germany and controlled in Eilat or *vice versa* (Fig. 6). The fact that the others are from countries adjacent to Germany (Finland, Poland, Lithuania, Hungary, Slovakia, Cyprus) strongly suggests that a considerable proportion of the Central European population migrate through the Eilat region (average distance  $2848 \pm 728$  km). This is contrary to Zink (1973) who found that maximum ring returns were along the Gibraltar and Italian flyways and only one nestling was controlled in Israel. Maximum time between ringing and recovery was 1 year and 6 months).

Similarly, the only control of a **Willow Warbler** (*P. trochilus*) was from Estonia. This concurs with Zink (1973), who found that European Willow Warblers, west of  $20^\circ$  E, were recovered in a

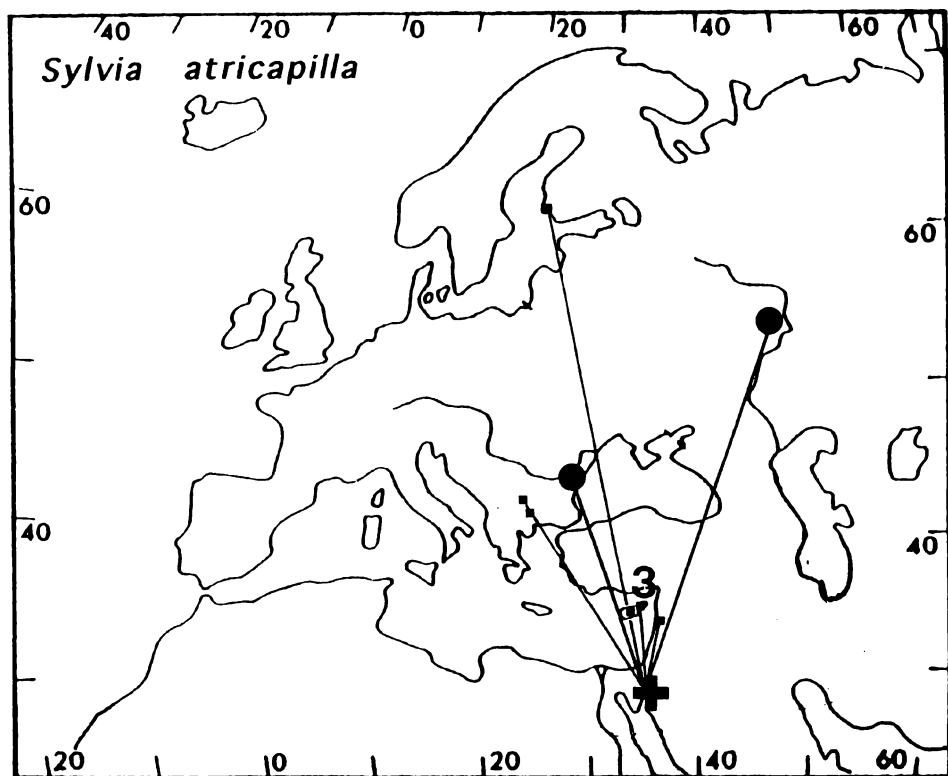


Figure 5. Recoveries of Blackcap (*Sylvia atricapilla*) ringed or controlled in Eilat and Central or Western Europe. Squares denote recoveries, and filled-in circles the Controls.

Abb. 5. Wiederrunde der Mönchsgrasmücke (*Sylvia atricapilla*), Beringung oder Kontrolle in Eilat und Mittel- oder Westeuropa. Quadrate bezeichnen Wiederrunde, ausgefüllte Kreise kontrollierte Vögel.

concentrated manner at the Gibraltar flyway, and east of 20° E they move through the Greek Islands and Israel.

Three of the four **Spanish Sparrows** (*Passer hispaniolensis*) recovered are from Cyprus (average distance  $603 \pm 133$  km) and the maximum time between ringing and recovery was 1 year and 10 months. Cyprus is within the known breeding range of this species (Shirihai 1996). Another was recovered near Cairo, Egypt.

#### 4. Discussion

These recoveries illustrate the fact that a considerable proportion of the breeding-bird populations from England in the west to central Asiatic-Russia in the east avail of the only land bridge connecting Europe and Asia to their wintering grounds in Africa. The importance of Eilat as a central point on the migratory route is established beyond doubt by the fact that although the number of ringing stations in eastern Europe and Africa are limited, and non-existent in Western Asia, several tens of birds have been recovered in the past four decades. These data stress the importance of taking a geo-



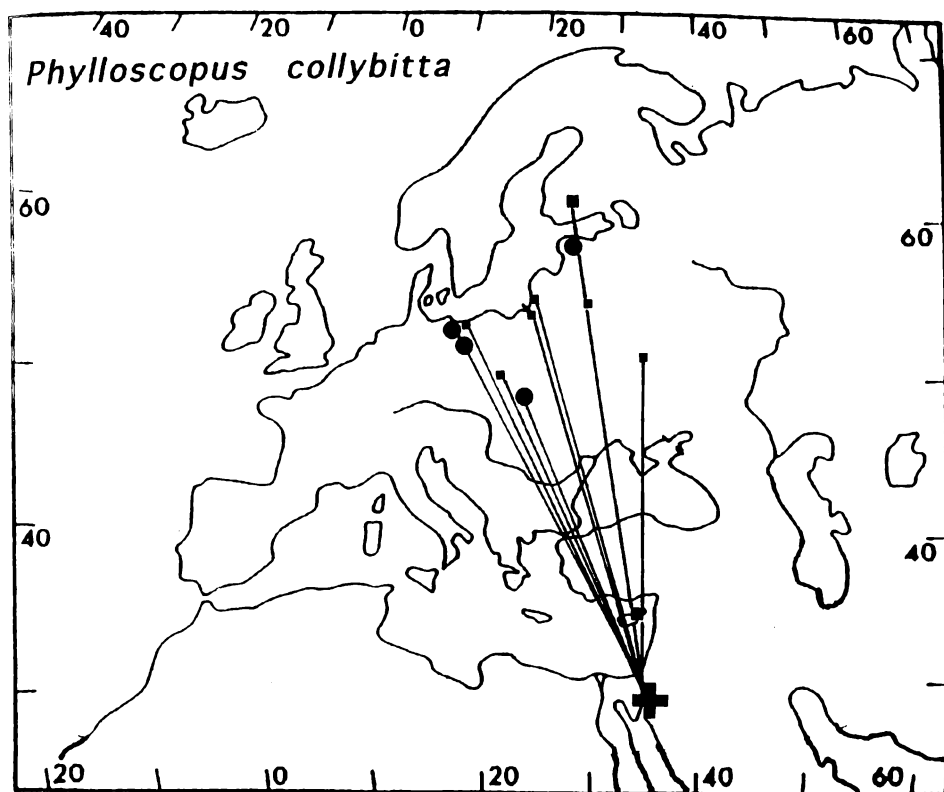


Figure 6. Recoveries of Chiffchaff (*Phylloscopus collybita*) ringed and recovered either in Eilat or Western Europe. Squares denote recoveries, and filled-in circles the Controls.

Abb. 6. Wiederfunde des Zilpzalps (*Phylloscopus collybita*), Beringung und Wiederfund in Eilat oder Westeuropa. Quadrate bezeichnen Wiederfunde, ausgefüllte Kreise kontrollierte Vögel.

physical and continental perspective to future conservation efforts. These data illustrate the folly of the various ringing stations that have created ringing organizations through which they coordinate their efforts and methods, but choose to ignore and exclude the only major ringing operation that monitors a vast volume of avian migrants of the eastern flyway of the western Palearctics, because of regional politics. This attitude must be corrected upon the part of these organizations if continental-level conservation is to be achieved, and cooperation and coordination attained, at the desired levels of the breeding bird populations of EurAsia that will continue to avail of the only land bridge that connects them to their wintering habitats in Africa.

## 5. Zusammenfassung

Eilat, das (im Herbst) vor oder (im Frühling) hinter den Zugrouten durch den Sinai und die Sahara gelegen ist, befindet sich im Zentrum des zweimal jährlich stattfindenden Zuges der eurasischen

Vögel. Insgesamt 113 in Europa beringte Vögel aus 21 Arten wurden entweder in Eilat gefunden (44 Vögel aus 12 Arten) oder wurden in Eilat beringt und außerhalb Israels gefunden (69 Vögel aus 16 Arten). Die am häufigsten gefundenen Arten sind Klappergrasmücke (*Sylvia curruca*), Weißstorch (*Ciconia ciconia*), Zilpzalp (*Phylloscopus collybita*), Rauchschwalbe (*Hirundo rustica*), Mönchsgrasmücke (*S. atricapilla*), Bachstelze (*Motacilla alba*) und Uferschwalbe (*Riparia riparia*). Die Bedeutung Eilats als Hauptknotenpunkt des Durchzugs wird durch die Tatsache unterstrichen, daß, obwohl die Anzahl der Beringungsstationen in Osteuropa und Afrika begrenzt und in Asien gleich null ist, in den letzten 4 Jahrzehnten mehrere Dutzend Vögel gefunden worden sind. Hieraus ergibt sich auch die verstärkte Forderung nach kontinentweiten Bemühungen zum zukünftigen Schutz der Vogelwelt.

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