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THE COLLARED TURTLE DOVE IN EUROPE.

BY

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(Plate 26).

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INTRODUCTION.

A poor maid was servant to a very hard-hearted lady, who gave her as wages no more than eighteen pieces a year. The maid prayed to the Gods that she would like it to be made known to the world how miserably she was paid by her mistress. Thereupon Zeus created this Dove, which proclaims an audible deca-octo to all the world to this very day.

It was this legend, here written as recounted by C. Hinke to J. Fr. Naumann (1837), that led the Hungarian naturalist Frivaldszky (1838) to name the Collared Turtle Dove *Columba risoria*, var. *decaocto* (now *Streptopelia decaocto*). He was sent the type specimen in 1834 by Hinke from Philippopolis (Plovdiv), which was then in Turkey-in-Europe, but is now in Bulgaria*.

* Owing to the obscurity of the journal in which Frivaldszky published his original description of the dove, there have been rather frequent errors in the literature. 'Frivaldszky' has often been spelt 'Frivalszky', and given various initials, G., E and I. His name, in Hungarian style was Frivaldszky Imre, which has been Germanised as Imre or Emerich von Frivaldszky. The most readily available version of his original paper is the German translation of Reiser (1894, p. 142).

Several authorities, including Peters (1937, p. 92) wrongly give "Turkey" as the type-locality of the species.

The many observers in Europe who have now heard the voice of *S. decacocto* must agree that Zeus did not do his job very well, at least as regards the Collared Turtle Dove's voice. But as official herald of the domestic servants' union the bird certainly seems intent on reaching the world, for in the course of the last twenty years it has spread about 1,200 miles north-westerly across Europe from the Balkans, and has been observed at 468 different new places at least, at many of which it has become a resident breeder within a year or two of its first arrival. The observation of what may have been the first one in Britain has been described by May and Fisher (1953). This paper describes the distribution of the species, and traces, in as much detail as the writer has found possible to collect, its spread across Europe. It has been a colonisation more spectacular than that of any other known land-bird, and has been even more rapid (in distance covered at least) than the spread of the Fulmar (*Fulmarus glacialis*), the sea-bird which has extended its breeding-range in the linear sense 2,319 miles in less than 200 years (Fisher 1952, p. 249).

THE SUPERSPECIES.

The genus *Streptopelia* is a large genus of doves; Peters (1937) holds to 16 species, one of which is known only from one single juvenile specimen and thus is doubtful. All but one of the remaining 15 species have several valid geographical subspecies; some have as many as 8 or 9 recognized races, and the whole genus contains no less than 78 described forms. Some of the species have obvious affinities, and one group in particular of 4 allopatric (non-overlapping) species could be united, as von Boetticher (1950) has tentatively suggested, in one *Artenkreis* or superspecies.

The first-described of this group is *S. bitorquata* (Temminck, 1810), of which the typical race is the "Double-ringed Turtle Dove" of Java and the Lesser Sunda Islands east to Timor. *S. b. dusumieri* (Temminck, 1823), the "Philippine Turtle Dove" is the other accepted race of this species; it inhabits northern Borneo, the Sulu Archipelago, Palawan, the Philippines and the Marianas; in these last it was introduced. The second species is *S. decacocto* itself (Frivaldszky, 1838), of which several subspecies have been described and two, *S. d. stoliczkae* (Hume, 1874) and *S. d. xanthocyclus* (Newman, 1906), are generally accepted. The third, African, is *S. roseogrisea* (Sundevall, 1857) of which the typical race extends from Lake Chad through Darfur and the central Sudan east to western Abyssinia. The two other forms of this, the "Pink-headed Dove" or "Rose-grey Dove" are *S. r. bornuensis* (Bannerman, 1931) which extends west from Chad as far as Timbuktu, and *S. r. arabica* (Neumann, 1904) which inhabits Arabia from Jidda to Aden, Eritrea and northern Somaliland. The fourth species, also African, is the White-winged Dove, *S. reichenowi* (Erlanger, 1901) which is only known from the Juba River in southern Somaliland

and from its southern Abyssinian tributary, the Dawa. In the latest standard work on East African birds (Mackworth-Praed and Grant, 1952) *S. roseogrisea* is regarded as conspecific with *S. decaocto*.

THE BARBARY DOVE.

This small, pale form of a *Streptopelia* species appears to exist only in domesticity. It was first described by Linnæus in 1758 as *Columba risoria*. It is often known as the "Collared Dove" and its superficial similarity to *S. decaocto* in the field has led to confusion, though the distinguishing characteristics are clear (apart from voice, size and colour, the distribution of black on the rectrices is quite different, and the blackish primaries of *S. decaocto* are diagnostic and a good field-character). The origin of *Streptopelia risoria* is not certain. Authorities such as I. Geoffroy Saint-Hilaire* (1860, 1861, quoted Oustalet) and Oustalet (1901)—favouring *decaocto* and others like Shelley (1883) and Hartert (1916) *roseogrisea*; but it is probably derived from *S. roseogrisea*, brought across to Italy and other countries of Europe from the Sudan via Egypt as a domestic house-bird in the second half of the sixteenth century (see e.g. U. Aldrovandi, 1599; Adametz and Stresemann, 1948). Schwenckfeld (1603) records it as imported to Silesia at 2 guilders a pair. In Italy particularly, but also in other parts of Europe including south England, Barbary Doves have established themselves in gardens and parks in a semi-domestic, semi-wild state. A. E. Brehm, the Italian edition (1898) of whose *Leben der Vogel* (first published in 1861) is quoted by E. Moltoni (1950b), writes of a great number at liberty in the gardens of the Castle of Miramar, near Trieste; and F. Arnold (1897) mentions some "lachtauben" on the islands in Lago Maggiore which from his description are clearly Barbaries. Already by 1792 or 1793 semi-albino *S. risoria* had been introduced by the Dutch into Bouton isle in the Tonga group, Pacific Ocean (Oustalet, 1901) which led to the belief, entertained for some time, that the "species" originated in the Pacific.

Taka-Tsukasa and Hachisuka (1925) record that albino *risoria* were introduced by the Chinese into the Pescadores Islands, off the western coast of Formosa, and have become quite common in the feral state, no coloured forms occurring.

HYBRIDS.

Considering that intergeneric crosses can be readily obtained among the Columbidae even between members of different sub-families such as *Zenaidura* x *Streptopelia* and *Columba* x *Streptopelia*, it is not surprising that ready hybridisation between different

* I. Geoffroy Saint-Hilaire thought that the turtle dove kept as a table bird by the ancient Romans was *S. risoria*, and that it was therefore most likely to be of Asiatic (thus *decaocto*) origin. But the Romans' birds did not breed in captivity, and were most likely ordinary Turtle Doves (*S. turtur*).

Streptopelia species occurs in captivity. Taibell (1930, 1931) shows that such hybrids are in most respects intermediate in character between their parents; but *S. decaocto* when mated with *S. turtur* or *S. senegalensis* produces offspring with the *turtur* or *senegalensis* neck-pattern, not the black half-collar, and without the blackish narrow rectrical web. This, if a general rule, may prove important to field-naturalists, for the spreading *S. decaocto* in Europe may sometimes hybridize with wild or semi-wild species that it encounters. Bodenstein (1946b), for instance, records a bird from Ingelheim, Germany, that was "without doubt (*zweifellos*) a wild hybrid between *S. turtur* and *S. decaocto*."

Poulsen (1950) described one of the first Danish *decaocto* as a female that mated with one of a group of *S. risoria* (he uses *roseo-grisea*) at liberty in a garden at Holstebro, Jutland; this pair was captured and later two hybrids were hatched. Such hybrids (naturally) have the black half-collar, but are smaller and paler than *decaocto*, and lack the full extent of black on the narrow web of the rectrices.

* * *

Streptopelia decaocto: ITS PAST AND PRESENT DISTRIBUTION.

The present world distribution of the Collared Turtle Dove is indicated in Map I which is compiled from all available recent authorities, and to which only notes on certain areas are perhaps necessary.

Japan. (von Siebold in Adametz and Stresemann; Austin in Stresemann, 1950; Jahn; Taka-Tsukasa and Hachisuka; Udagawa). The Collared Turtle Dove is an introduced species present in the main island Honshu only; it was brought from China in the eighteenth or early nineteenth century, certainly by 1830. It apparently became plentiful in the Kwanto area round Tokio by 1875, but was much reduced by shooting before 1900. By 1925 it was known only from Saitana and Chiba, the Imperial game reserves near Tokio, though previously it had been obtained as far west as Kyoto. A further twenty-five years of hunting, with war and occupation, placed it in danger of extermination, and it may now actually be extinct (Udagawa). It is, or was, an absolute resident breeding from April to July.

Korea and China. (Lönnerberg; Meise; Reichenow; Riley; Roonwal; Shaw, 1936, 1938; Stresemann, Meise, and Schönwetter; Taka-Tsukasa and Hachisuka; la Touche). The Collared Turtle Dove is not rare in Korea, where it has been (insufficiently) separated as *S. d. koreensis* Buturlin, 1934; this represents its northerly limit in eastern Asia, apart from one isolated and clearly casual record from Mariinsk on the Amur River in 1855 (Tachanovskiy, 1893, quoted by Meklenburtsev, 1951) which is the only one from the far eastern U.S.S.R. In China the distribution runs north to Jehol, Peking,

Paotow on the northern loop of the Hwang-Ho, and Kan-chow in Kansu, on the northern side of the Nan Shan. In this range all birds are of the *decaocto* race, but in south China they tend towards the Burmese *xanthocyclus* in form, but have not been fully worked out. Save that the species is found in the lower reaches of the Yang-tze-kiang and in Fukien, its southern limit in China appears to be unknown. It is not found in Yunnan, Indo-China or Siam.

Burma, (Newman; Peters; Roonwal). The Burmese race *S. d. xanthocyclus* (Newman, 1906) extends south to Pegu, north-east to the Shan States and Bhamo, and north-west beyond Arakan and the Chindwin to Chittagong in Pakistan and Manipur in Assam. Beyond, from Cachar in Assam and East Bengal westwards, the race is once more *decaocto*, and the population the great one of India.

India and Ceylon. (Ali in Stresemann, 1950; Blanford; Christison; Hellmayr; Hutson; Meinertzhagen, 1920, 1927; Osmaston; Richmond, 1896; Roonwal; Ticehurst, 1923; Wait; Whistler, 1922, 1925, 1926, 1930, 1949). This heartland of *Streptopelia decaocto* contains the typical race *decaocto*. It lives in practically all cultivated country, leaving some high-mountain areas in winter, but otherwise behaving as a dispersive resident. It is absent as a breeder otherwise only from some parts of the west coast (see Map 1) including Cutch and Kathiawar to which it is, however, a winter-visitor; and it is only found at the northern end of Ceylon. It reaches far and high into the Himalayas and even the Karakoram, in Nepal, Kangra, Lahul, Ladakh and Kashmir. West and north-west through Pakistan it extends beyond Sind and Baluchistan and the North-west Frontier Province into Afghanistan.

Turkestan. (Gladkov; Hellmayr; Hume; Ludlow and Kinnear; Meklenburtsev; Richmond, 1896b; Roonwal). The large pale well-marked race of Turkestan, *S. d. stoliczkae* (Hume, 1874) occupies the cultivated parts of this great upland plain (where it is the commonest dove), mostly in Chinese Turkestan and Sinkiang, but extending over the border into Russian Turkestan; reaching from Kashgar, where it was first collected by F. Stoliczka, south to Yarkand and Sanju, east to the Cherchen Darya, north to Uchturfan and Aksu and over the border to Alma Ata and Jarkent, and west as far into the U.S.S.R. as Frunze, Chimkent and Tashkent.

Afghanistan, Persia and Iraq. (Adametz and Stresemann; Arndt; Hartley; Meinertzhagen, 1924, 1938; Meklenburtsev; Paludan; Roonwal; Sarudny; Serebrovskiy). *Streptopelia decaocto zarudnyi* Serebrovskiy, 1928 of Seistan, Persia has been insufficiently separated, and the Collared Turtle Doves of this area are *S. d. decaocto*. They extend through the cultivated parts of Afghanistan from Kabul and Jalalabad westwards, and just over the border of the Turkmenskaya S.S.R. at Kushka and Tahkta Bazar. In Persia they have been observed from Husseinabad (Seistan) in the

east, possibly to Gilan in the north, and certainly in Isfahan and Sanjar in the south-west; over the Iraq border they are recorded in the plain from Baghdad, Ramadi, Khanagin and Mosul.

Asia Minor and the Balkans. The researches of Adametz and Stresemann (1948) and Stresemann (1950) have shown that it is unlikely that the Collared Turtle Dove had spread west to the Levant before the sixteenth century, though a dove referred to as *warashan* or *warschân* in the Persian and Arabic literature of the tenth century may indicate, though it does not prove, that the species then inhabited Persia. One particular mention of the *warashan* is in a work of A.D. 968-77 by Abu Mansur Muwaffak ben Ali Harawi (Arndt, 1925). Unfortunately this dove does not appear to have been figured.

Between 1546 and 1549 Pierre Belon du Mans, tutor to Prince Henry, the heir to Francis I of France, travelled widely in the Levant and the Balkans, staying in Philippopolis, Constantinople, Damascus, Antioch and several other towns. Although the title of his book (1553) indicates that he was interested in *choses memorables* (and indeed, his book was full of them) this unusually accurate naturalist nowhere mentions anything which could be recognised as the Collared Turtle Dove. Neither did the wise teacher Pierre Gilles, another of Henry's tutors. Nevertheless, Stresemann (1950) is satisfied that *Streptopelia decaocto* was, by 1547, already one of the birds of the town of Constantinople. It appears that the newly appointed French ambassador to the court of Suleiman the Magnificent, Sultan of Turkey, a Monsieur d'Aramont, procured in Constantinople as a present for Henry, turtle doves of a rare and unique kind. They reached him among the Sultan's other gifts for his coronation. Stresemann, who quotes this from the accounts of Conrad Gesner (1555) and Ulisse Aldrovandi (1599) is certain that this refers to the Collared Turtle Dove.

It is not possible to trace with any historical accuracy the build-up of the populations of the Collared Turtle Dove in the Levant, Turkey and the South Balkans between 1547 and the start of the great spread of the twentieth century. Our detailed knowledge of the bird's present distribution in this region comes largely from modern papers and there is no suggestion in these that the Collared Turtle Doves were recent arrivals in the places where they were observed. In the Levant, the Collared Turtle Dove is found as far south as Gaza in Palestine and Amman in Transjordan. Other places are Ramleh, the Jordan valley, Jerash (Gilead), Nazareth (Tabor), Haifa, Beirut in the Lebanon, Aleppo in Syria. It is present in the towns of Cyprus, Rhodes and Samos. It has not been known in Crete, but in 1939 a "possible" was recorded at Hierapetra. In Turkey it has been found at Adana and Antalya on the south coast and up the inland valleys as far as Konia and Isparta. On the Ægean coast it is known from Aidin and Izmir

(Smyrna). It was recorded from Bursa near the Sea of Marmora as early as 1842, and is known inland from here as far as Eskishehr; and at Nicæa at the east end of Lake Iznik. In north and central Turkey it is found inland as far as Ankara and Tokat and on the Black Sea coast at Bafra and Samsun. It has not been recorded in north Turkey east of Samsun and Tokat, nor in any neighbouring part of the U.S.S.R.

Apart from Rhodes and Samos, places in Europe which are certainly inhabited now and which may well have been inhabited before the spread began, are listed in the appendix (p. 171) under groups (a). Rhodes and Samos appear to be the only Ægean islands from which *Streptopelia decaocto* has been recorded; and on the mainland of Greece the Collared Turtle Dove appears never to have been encountered, not even since the great spread started, south of the line joining Valona in Albania and Salonika. The area occupied before 1912 appears to have been the coastal region of Albania and part of the adjoining Yugoslavian coast as far north-west as Mostar in Herzegovina (where the Collared Turtle Dove was found in 1888), Macedonia, Thrace, Turkey-in-Europe, Bulgaria as far north as Philippopolis (Plovdiv) and Stara-Zagora (but not in the Danube provinces north of the Stara-Planina), and southern Serbia in Yugoslavia as far as Niš. The Collared Turtle Dove was certainly also established at latest by 1920 as far along the Black Sea coast as Constanza in the Dobrogea in Romania.

The main spread gathered its momentum primarily in the great plains and valleys of the Danube north of Belgrade, as will be described presently. However, two minor spreads appear to have taken place wholly in the Balkan Lower Danube region; although they started rather later than the main spread, it will be convenient to describe them here.

The first concerns south-western Yugoslavia and the Adriatic coast and runs from Mostar to Sarajevo (1930), thence to Nin, Benkovac and Split.

The second concerns the Danube east of the Iron Gate. In or before 1933 the Collared Turtle Dove was found in Danubian Romania at Podu-Groşului and in Western Calafat, and across the river in north-western Bulgaria was recorded from Vidin in 1937, Lom-Palanka in or before 1943 and several small towns and villages near by in 1944. Further down the Danube the Collared Turtle Dove was first recorded at Rusçuk in Bulgaria in 1932. At about the same time it was recorded at Oltenita across the Danube in Romania, and appears to have spread from here to Bucharest in 1943. In 1939 Heer (1950) with the German forces found it at Neu-Borodino in what is now Soviet Bessarabia and he records what was possibly one also at Akkerman at the mouth of the Dniester in 1940. At Galatz in Romania the Collared Turtle Dove was seen in 1944.

The Central Danube and the Plain of Hungary.—Many workers have recorded this part of the spread in great detail. It is mostly in Hungary and the Danube region of Yugoslavia, but extends into what is now Soviet Ruthenia and breaks out finally through the Bratislava-Vienna gap to fan out beyond in three directions—(a) Austria-South Germany-Switzerland-France, up the Danube; (b) the plain of Bohemia via the Brno-Pardubice gap; and (c) Poland and Germany probably by the break in the mountains in the region south-west of Moravska Ostrava.

The Collared Turtle Dove arrived at Belgrade in 1912, the nearest places previously occupied being Niš and Prokuplje in Serbia. For the first time the bird stood on the Danube west of the Iron Gate. Within 50 miles of Belgrade there were, oddly enough, no further appearances other than in the town itself until the late 1930's and early 1940's. But probably in 1930 and certainly in 1932 the Collared Turtle Dove appeared at Monor, south-east of Budapest, an advance of 180 miles from Belgrade. In 1932 it was also found in eastern Hungary at Berettyóújfalú and further down the Danube at Paks. Each of these places appears to have acted as a centre of spread. From Monor many eastern suburbs of Budapest were colonised and some places further north. From the apparent direction of Berettyóújfalú eight other places in eastern Hungary were colonised between 1935 and 1943, and in 1946/47 the dove was found in two places over the border in Ruthenia. Paks appears to have been the centre of a big consolidation of southern Hungary extending over the border to Zombor, Subotica, Zenta and other places in Danubian Yugoslavia. And from Paks there was an apparent spread also north-west reaching Székesfehérvár in 1934. From here may have been colonised the western suburbs of Budapest, both shores of Lake Balaton, western Hungary including Nagykanizsa and Szombathely. From this last there appears to have been a colonisation of many places in the neighbourhood of Graz in south-eastern Austria in the late 1940's. There was also a big colonisation further west in southern Austria, at the same time, in the region of Klagenfurt; but this may have been derived from Zagreb in Yugoslavia, where the Collared Turtle Dove was first seen in 1939 and which was probably colonised from the direction of Lake Balaton. From Zagreb a further spread appears to have developed in the direction of Trieste, Fiume and the Lombardy plain of Italy, which will be described presently.

Returning to the Danube, we find the first records from Czechoslovakia in 1936 at Komárno on the north bank of the Danube and at Ipolybogen (Hontské Darmoty) about 70 miles to the north-east. The doves probably came to these places from the area round Székesfehérvár west of Budapest. From the direction of Ipolybogen a chain of appearances took place in villages and towns in northern Hungary, and the chain ends among the Carpathian

foothills at Michalovce and Košice in Czechoslovakia and Užhorod and Cop in Ruthenia. The most powerful spread, however, from Komárno was north-west, reaching Tyrnau and Bratislava in 1938.

North Italy.—The first record of a Collared Turtle Dove in Italy* was in 1944 at Caorle on the coast north-east of Venice. This is about 150 miles west of Zagreb in Yugoslavia, the nearest place already colonised. Since then the dove has been recorded from places north of Caorle, the most northerly being Udine. Across the top of the Adriatic *decaocto* was recorded from Trieste in 1947, from the island of Krk, Yugoslavia, in 1949 and from Fiume in 1950.

The Collared Turtle Dove's first appearance in the Po valley was in 1949 at Saronno near Milan, nearly 190 miles due west of Caorle; in 1950 it was observed in five places from Gallarate and Milan to Budrio near Bologna. In 1951 it was recorded from five more places. In May, 1952, E. M. Nicholson, C. P. Blacker, R. May and the writer observed the members of what was recorded as a breeding pair in the garden of a theological seminary in Milan, and the species probably nested as far north as the shores of Lakes Varese (Gavirate) and Como (Mozzate).

The Upper Danube, Upper Rhine and France.—The first place to be colonised by the Collared Turtle Dove in Austria was Hirm, west of the Neusiedlersee, where it was seen in 1938. It is not far from the Hungarian border and about 40 miles south-west of Bratislava, also colonised in 1938. Many places near Bratislava, Hirm and Sopron in Hungary were colonised in the 1940's. Vienna was first colonised in 1943 and many places in its suburbs and within a radius of 20 miles in the middle 1940's.

By 1948 Collared Turtle Doves were in towns and villages scattered all the way up the Austrian Danube and as early as 1946 some had crossed the German border and bred at Straubing, thence to reach Augsburg in 1947, the neighbourhood of Munich, Aalen and near Stuttgart in 1948. In 1949 they had crossed into S.W. Czechoslovakia (České Budejovice) and had reached Klatovy by 1952. By 1949 the Collared Turtle Dove was also in the Upper Rhine; it was recorded in northern Switzerland at Rothrist; by 1950 it was found also in the Zurich canton and at Basel, and at Remomeix in Vosges, France, about 55 miles west-north-west of Basel. The bird recovered at Juniville in the Ardennes in 1952 was nearer here than the locality of any other previous record; but it had been marked in a nest near Halle in Saxony the previous year.

The Plain of Bohemia.—Judging by the order in which its places were colonised, Bohemia was invaded from the south-east (though the Collared Turtle Doves of Dresden—at the gate of Bohemia—and

* The bird recorded by Doderlein (1867-71, quoted Giglioli, 1889) from the outskirts of Modena may have been *S. risoria*, most probably.

its neighbourhood may have come from exactly the opposite direction). From Vienna (1943) the dove reached north over the Czech border to Brno (Brünn) in the same year. By 1946 it was through the hills by Svitavy to Pardubice, and in 1947 and 1948 reached at least 13 places in the whole breadth of the Bohemian Plain, including Prague in 1947. The bird that reached Zittau in East Saxony, Germany, in 1950 may have been of the Bohemian colonists rather than of the Saxony spread.

Poland.—The Collared Turtle Dove appears to have passed through the Olomouc-Moravska Ostrava gap in 1940 when one was seen at Ůls (Olesnica), north-east of Breslau, in what is now Polish Silesia. The nearest places previously reached were Tyrnau (Trnava) and Nagyszombat north-east of Bratislava in Czechoslovakia, 195 miles away. In 1949 it was first seen at Kraków, nearly 100 miles east-north-east of the nearest previously inhabited place (Valašské Meziříčí in Moravia); and in 1950 first bred there, being also seen in that year at Bochnia and Nowy Sacz, south-east of Kraków. Also in 1950 *decaocto* was seen at Posnán, 85 miles north of Ůls, and well down into the Plain of Poland.

The North German Plain.—The first records of the Collared Turtle Dove in Germany * were in 1945 at Haldensleben and Gröningen in Lower Saxony, and at Pattensen near Springe, south-west of Hanover. The nearest previously inhabited point was Ůls in Silesia, 260 miles east of Gröningen! These places appear to be the centres of a considerable colonisation. One "spread" has apparently penetrated Saxony in a south-easterly direction, reaching Wettin and breeding in Oschatz in 1947; and reaching, by 1951, up the Saale as far as Halle (1950) and Jena (1951), up the Mulde as far as Zwickau and up the Elbe beyond Dresden to the gate of the Bohemian Plain. From this area come the two ringed Collared Turtle Doves so far recovered. One was caught in a chicken-run at Haldensleben (Calvörde) on January 19th, 1951, and was shot on October 10th, 1951, at Latisana, south-west of Udine in northern Italy about 445 miles south (Weber, 1952). Dr. F. Goethe informs me that *S. decaocto* bred at Holleben near Halle in 1951, and that a nestling ringed there on July 24th was found dead on May 1st, 1952, at Juniville in the Ardennes—the furthest penetration of France so far recorded, and about 360 miles W.S.W. of where it was ringed.

Another spread struck east-north-east from Saxony into Brandenburg in 1950 and 1951, the doves appearing in 9 places from Paylitz in the west to Berlin, and south to Töpchin, north to Templin.

* Ludwig Koch tells me that in June 1929, while making a sound recording of the Eagle Owl (*Bubo bubo*) at Merseburg-an-der-Saaleck in Thuringia, he heard and recorded a peculiar note from a dove. When he played this later to O. Heinroth, Heinroth identified it as *S. decaocto*. It was in orchard country about 1 km. from houses, and Koch points out that it might have been an escape.

Other spreads went south-west ; four places on the south side of the Harz Mountains were visited in 1950, and in 1951 Northheim : and the spread south-west to Hesse on the Rhine (see below) can also be derived from Haldensleben.

Brunswick was colonised in 1949 ; it lies between Gröningen and Springe, the places in Saxony and Hanover reached in 1945. North of Brunswick Collared Turtle Doves have now extended as far as Dannenberg, where they bred in 1950. From Hanover a spread south-west brought the dove in 1947 to Soest in Westphalia at the edge of the Ruhr ; it is from here that we can trace spreads into central and north Holland (p. 165).

The arrival and breeding of the Collared Turtle Dove at the Hanover town of Celle on the Aller in 1948 appears to have been an important event, for it is the nearest place to the appearances by the North Sea coast of Germany and Denmark, in the Kattegat and at the west end of the Baltic in 1948-50, which will be described presently.

Hesse.—The Collared Turtle Dove was seen at Hofheim in this Rhineland province in 1946 ; it is 175 miles from Haldensleben in Saxony, the nearest previously inhabited point. By 1948 it had spread to Ingelheim on the Rhine and Fulda, by 1949 to Mainz, Mannheim and Göttingen, by 1950 to Frankfurt, Aschaffenberg, Worms and Wetzlar. The southernmost points so far reached in this area are Hockenheim in Baden in 1949 and Lachen near Neustadt in the Palatinate in 1951.

Baltic Kattegat.—On May 20th, 1949, an undoubted Collared Turtle Dove was seen at the island observation station Vogelwarte-Hiddensee off the Baltic coast of Pomerania. Hiddensee is 180 miles north-east of Celle, the nearest place to be occupied before 1949. This has not been the only Collared Turtle Dove seen at the west end of the Baltic ; for 75 miles further north one was captured at Malmö in Sweden on October 15th, 1950, and in the same year ('summer') some were seen at Harlösa 20 miles N.E. of Malmö. These birds at Harlösa bred (2 pairs) in 1951 and attempted to do so in 1952. However, in 1948 an even greater 'leap' took place, for Collared Turtle Doves in that year were seen (and have been seen since) at Skagen at the very north tip of Jutland in Denmark. This is 355 miles north of Celle. Next year, on May 16th, 1949, one was shot at Råö in the parish of Onsala, in Halland, Sweden, on the other side of the Kattegat ; and in 1952 one was seen at Fjärås, 12 miles N.E. of Råö.

German and Danish North Sea Coast.—This appears to have been colonised from the direction of Celle in two 'prongs'. The more northerly reached Husum and Drelsdorf in Schleswig in 1949, and in the following year the dove was seen at Dithmarschen, also in Schleswig. The limit of this part of the spread appears to have been

reached at Holstebro in Jutland, Denmark, 120 miles north of Dreisdorf, where at the beginning of July, 1950, a female Collared Turtle Dove appeared, mated with a male Barbary dove (*Streptopelia risoria*) and produced hybrids. Later in the same year another Collared Turtle Dove was seen at Bøvlingbjerg on the coast north-west of Holstebro, a male appeared at Holstebro, and one was caught at sea, 3 miles off Nymindegab, Jutland.

Down the Weser from Celle Collared Turtle Doves arrived in Bremen, Wilhelmshaven and Dorum in 1950 and in the same year up the coast in Cuxhaven; in 1951 also Bederkesa.

Holland.—We can derive the Collared Turtle Doves of both north and central Holland from Soest in the Ruhr, where the bird was first seen in 1947. In 1950 it reached Lüdinghausen in Westphalia, Nordhorn in Western Hanover, and continuing down the west side of the Ems, Musselkanaal over the Dutch border, where a pair bred in 1950, and a bird was again present in 1952.

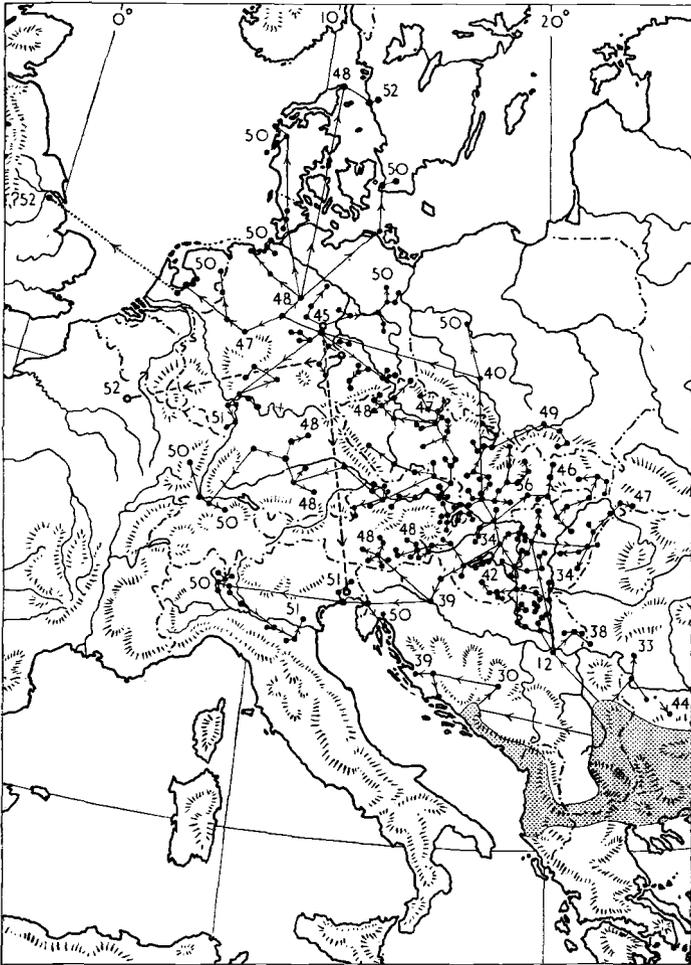
The main Dutch group is, however, at the south-east end of the Zuider-Zee. A pair probably wintered at Harderwijk in 1948-49, probably bred there in 1951 (three were seen) and certainly bred there in 1952. Pairs (or two birds) were seen at both Hulshorst and Oldebroek in 1950. A pair was seen at Amersfoort in 1952; later 8 birds, mostly juveniles; still later no less than 16.

Britain.—At Manton in Lincolnshire a male Collared Turtle Dove held a territory through the summer of 1952 (May and Fisher, 1953). Circumstances are such that the possibility of its having been an "escape" cannot be ruled out, though the writer is of the opinion that it is more likely to have been a wild bird than not.

* * *

THE GENERAL NATURE OF THE SPREAD.

In the maps (p. 166, plate 26) which have been prepared of the spread, the sequence of events has been made clearer by joining points where the Collared Turtle Dove has been observed to the nearest point where it had been previously observed. This device was not adopted on the assumption that it would indicate the *real* sequence of the colonisation, or that when they spread through Europe the Collared Turtle Doves would necessarily do their pioneering by extending paths already colonised. The only two ringing recoveries available show very clearly that some pioneering doves at least, do not come from the nearest place colonised but from a considerable distance. The dove that appeared at Latisana in North Italy in 1951 was marked as an adult about 445 miles away in Saxony nine months before. The dove found dead in the Ardennes was about 360 miles away from where it had been ringed as a nestling in Saxony, not much over nine months before. And even by joining points to nearest previous points we have to take account of 'hops' of up to 355 miles. Unquestionably, then, individuals of the spreading Collared Turtle Dove can make great



MAP II: THE DISTRIBUTION OF THE COLLARED TURTLE DOVE (*Streptopelia decaocto*) IN EUROPE, SHOWING THE PRINCIPAL PLACES WHERE IT HAS BEEN RECORDED, AND SOME DATES OF FIRST ARRIVAL. Shaded area represents that occupied by c. 1900. Unbroken lines connect localities with nearest places at which previously recorded. Broken lines connect origin and recovery-spots of the two ringed returns.

leaps of 300-400 miles. We know that one such 'leaping' individual was a young one in its first year, and it will be interesting to see whether ringing results eventually prove that the chief pioneering is done by young birds, as it almost certainly is in the case of the spreading Fulmar (Fisher, 1952).

Nevertheless, in spite of their property of 'hopping', it would

seem that many suitable areas have been colonised in a very orderly way. The sequences of events in the Upper Danube, in the Carpathian basin and in the Bohemian Plain round Prague bear this out. In one year several places will be simultaneously colonised in a main part of a valley; in a subsequent year apparent thrusts will penetrate a few miles more into towns and districts up the side-valleys.

The main phase of the spread has occupied a singularly short time, for it cannot be said to have warmed up until the early 1930's. In the last 30 years, the Collared Turtle Dove has been observed in at least 468 places in Europe at which it has never been observed before, those in Scandinavia lying about 1,200 miles from Belgrade, the point where the spread can be said to have started in 1912, and Monor in Hungary where it can be said to have 'caught fire' in or before 1932. Up to 1943 (the last year in which Keve-Kleiner gives a detailed account of occupied places in Hungary) the number of localities in which the Collared Turtle Dove had been observed beyond its basic Balkan distribution (see plate 26) had risen from 4 or 5 to no less than 169, and a plot of the number of places visited has been geometric (multiplicative) rather than arithmetic (additive): the number of places recorded consistently increased at about thirty per cent. per annum, an extraordinary figure. After 1943 the average number of new places recorded annually fell to about twelve per cent. of the number of places recorded by the previous year; but this itself continues to be a remarkable increase. If the increase had continued after 1943 at the same rate nearly 2,000 places would have been recorded by 1952. Unquestionably the sudden change in the rate of increase was due to the cessation of detailed recording in countries where the dove was becoming commonplace. Unfortunately, detailed records have not been published for Hungary and Yugoslavia after 1943, for Bulgaria and Rumania after 1944, for the U.S.S.R. after 1947 and for Austria after 1949, though thanks to private information from Dr. W. Černý I have records from Czechoslovakia to 1952. In Germany detailed publication of records continues, to include those of the season 1951, and in the countries to which the Collared Turtle Dove has only spread in the last few years, such as Poland, Italy, Switzerland, France, Holland, Denmark, Sweden and Britain, ornithologists are so expectant that the chances of records being overlooked or unpublished are probably very small. I doubt, however, if even the thorough Germans will continue to record every *decaocto* occurrence any longer. Although their first bird did not arrive till 1945, they had recorded the species from no less than 78 places by the end of the season 1951.

HABITAT.

In its spread across Europe the Collared Turtle Dove has shown certain pronounced habitat preferences which have been widely

commented upon. The literature is full of evidence that what it likes for food and shelter resembles very closely that which it enjoys in India, which can be assumed to be its ancestral home. It is a graminivorous bird of parks, gardens and cultivated land, typically where cultivated land abuts on marginal scrubland, and it has become a pronounced parasite, or at least symbiote, of Man, having little fear of him (at least in much of its range) nesting freely in his gardens, frequently feeding with his chickens and other domestic animals and raiding his ripened corn and stackyards*. Of the birds of Turkestan, the Collared Turtle Dove, according to Gladkov (1938) is among those most rigidly confined to the cultivated parts, and his investigation suggests that it has spread into Central Asia relatively recently after the rise of cultivation. Keve-Kleiner's very fine analysis (1944) of the literature shows how closely the establishment of the Collared Turtle Dove is associated with villages and small holdings.

The first record of a Collared Turtle Dove at a village is, of course, not always followed by the arrival of a mate and successful breeding. Several of the Continental records are winter ones, often of wandering flocks, some of up to a hundred members, obviously in search of food. But from May to September the pioneers appear to become mostly resident and territorial, and, if they find mates, may frequently rear three broods in a year and almost always two. The species seems emphatically disposed to nest in conifers, particularly cypresses, also cedars, larches and pines. Perhaps the greatest amount of movement, and certainly the greatest crop of desultory records, takes place in autumn, as might be expected with new-fledged young birds "seeking their fortunes."

CAUSES AND COMPARISONS OF THE SPREAD.

The intention of this paper is primarily to establish in detail the true events of the great spread of *Streptopelia decaocto* across Europe, rather than to examine the reasons for it or enter into other aspects of the Collared Turtle Dove's life, such as its breeding habits. The spread, as far as can be seen, bears no resemblance to the occasional incursions of Mediterranean species, north-westwards, under exceptional circumstances, such as brought the great invasions of Pallas's Sandgrouse (*Syrhaptes paradoxus*) to Britain in 1863 and 1888, or the breeding Black-winged Stilts (*Himantopus*

* In their comment (*antea*, p. 55) to the paper by May and Fisher (1953) the Editors of *British Birds* suggest that the Lincolnshire Collared Turtle Dove of 1952, which gradually deserted the chicken-run in which it first fed on arrival, showed behaviour consistent with a bird that had been in captivity and was gradually turning to a fully wild existence. It is of course possible that the Manton bird may have been an "escape," but it is quite commonplace behaviour for the spreading wild Collared Turtle Dove on the Continent to turn up at chicken-runs. The seasonal change of the Lincolnshire bird to ripe corn could have been simply a move to an even easier food-supply than that in the chicken-run; its increasing restlessness, due to the eventual waning of its long territorial "drive."

himantopus) to Nottingham Sewage Farm in 1945. The Collared Turtle Doves have consolidated their invasion of Europe by breeding in it almost as quickly as they have pioneered it. Often they arrive in villages for the first time one spring and produce more than one brood in the same season. Nearly always they breed within two years of first holding a territory at a place. But it is not possible to state what percentage of the 468 places recorded for the dove in Europe are now breeding-places, for the literature is often equivocal on such matters.

Species which have spread or are spreading in a northerly or north-westerly direction in Europe are now known to be many. Much attention has recently been given to the consequences of the ameliorating summer climate of Europe. One of the more interesting spreads, which has been going on for very much longer than that of the Collared Turtle Dove, is the spread of the Serin (*Serinus canarius*). Ernst Mayr (1926) was the first to make a really detailed statement and summary of the spread of the Serin across Europe. His admirable analysis is not accompanied by maps, but there is a good one in the paper by B. Rensch (1941) which shows that in about 1800 the range of the Serin extended not much further north than Yugoslavia, Italy and the southern part of France, with extensions up the Rhône into the Upper Rhineland and into the western part of the Carpathian Basin. Very much more slowly than that of the Collared Turtle Dove, but quite surely, a spread subsequently took place, at first further up the Danube and down the Rhineland and into the German plain, but also west through France; the latter is agreeably described by Delamain (1933). At present breeding Serins have reached the Channel coast, though not on its full length, and have penetrated far into north Germany. However, in 150 years the Serins have not gone nearly so far as the Collared Turtle Doves have gone in 20.

During the last century and the early part of the present century another species, the Grey Wagtail (*Motacilla cinerea*) had an expansive phase rather similar to that of the Serin, though its expansion seems now to have stopped. "During this period," writes Mayr (1942) "it descended from the mountains and hills of central Europe and colonised the great plains of northern Germany and Denmark, finally reaching mountainous Scandinavia, where it multiplied very rapidly."

Some other species, however, have recently begun to spread north-westwards with a velocity very much greater than that of the Serin or the Grey Wagtail, though still not approaching that of the Collared Turtle Dove. Schenk (1944b) describes the spread of the Olivaceous Warbler (*Hippolais pallida*) into the Hungarian plain from the Lower Danube. In 13 years it advanced over 150 miles. According to Keve-Kleiner and Udvardy (1951) the Syrian Woodpecker (*Dryobates syriacus*) was discovered in the Lower

Danube in 1928 and by 1950, in 22 years, had advanced over 160 miles. This woodpecker has continued its spread and, a species unknown in Europe before 1890, has now reached southern Slovakia. In 1951 there was circumstantial evidence that it bred in Austria by the Neusiedlersee (Bauer, 1952, who gives a good map of the spread), and it was proved to breed there in 1952 (Mächler, 1952).

These spreads from the south-east, from the Near East, are quite different from the westward spread of certain northern species like the Yellow-breasted Bunting (*Emberiza aureola*) (see Timoféeff-Ressovsky, 1940, and Kleinschmidt, 1941). Probably the later ones are more closely connected with climate than are the earlier spreads of the Serin and the Grey Wagtail. But in all cases some initial barrier appears to have been lifted so that the species could surge forward. In the case of the Collared Turtle Dove there is no doubt that once it had penetrated into the Carpathian Basin, every further move north-westerly took it into country where the human population was increasingly tolerant of wild birds; even of parasites of cultivation and poultry-rearing, if the Collared Turtle Dove can be so described. The Collared Turtle Dove was virtually (and in some cases, actually) protected in most western European countries before its arrival.

The search for the real reason or reasons behind the Collared Turtle Dove's spread seems likely to entertain European ornithologists for a considerable time. Whatever the underlying cause or causes, it seems likely that the spread has been so successful and spectacular partly because of man's new-found tolerance of wild animals.

Mayr (1942) writes that: "The biographer encounters not infrequently the phenomenon that a species, after a long period of stagnation, suddenly enters upon a phase of aggressive range expansion." He shows that this type of phenomenon might even be termed "frequent"; though students of the range-statements in most faunal textbooks (even *The Handbook*) might not think so. Later, Mayr (1951) expresses himself quite categorically in suggesting that "in all cases of explosive range expansion such as have occurred in the Serin . . . and in the Ring Dove (*Streptopelia decaocto*), there is reason to believe that this expansion was initiated by a genetic alteration of the peripheral populations." While I do not believe this necessarily applies to the Fulmar, whose range-change can be explained by a change in food-supply, I am sure that Mayr's suggestion fits the case of the Collared Turtle Dove. But what has altered, and the mechanism of the change, remain mysteries.

During their aggressive periods, Mayr shows, species may jump geographic barriers that would normally stop them. *Streptopelia decaocto* has made such a jump; indeed it has made one of the most remarkable range-changes to have been recorded, ever since man began to record the ranges and changes of birds.

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APPENDIX

RECORDS OF THE COLLARED TURTLE DOVE IN EUROPE.
(Post-war Political Boundaries.)

There is no certainty that the years (*a*)—which are the earliest in which Collared Turtle Doves have been recorded at the places named—correspond to the years in which the doves actually first came to the places. The years (*b*), however, are probably close to, or the same as, the years of first arrival. Years in brackets are those of publication of undated records which have therefore occurred in that year or a previous year. Numbers in brackets after the name of the country give the total places recorded.

TURKEY-IN-EUROPE (6).

(*a*) c. 1547 Constantinople (Istanbul); (1920) Adrianople (Edirne); 1937 Rodosto (Tekirdag), Alpullu, Usunköprü; (1950) Dardanelles.

(Adamez & Stresemann, Belon, Keve 1944, Molineux, Moltoni 1950, Naumann, Stresemann 1920 1943b 1950.)

GREECE (9).

(*a*) 1911 Rhodes; 1918 Vertekope (Cheltikchi); 1934 Salonika; 1935 Kavalla, Xanthi, Alexandroupolis (Dede Agach), Komotini (Gumurdjina); (1950) Samos.

(*b*) 1939 (probable) Hierapetra (Kasteli) in Crete.

(Bodenstein 1949, Glegg, Harrison & Pateff, Jany, Keve 1944, Molineux, Moltoni 1950, Profft, Stresemann 1920, Weigold, Wettstein, Wirries; and information from Goethe.)

ALBANIA (5).

(*a*) (1893) Valona; 1900 Scutari; c. 1906 Durazzo; 1931 Elbasan; 1935 Fjeri.

(von Führer, Keve 1944, Lodge, Salvadori 1893, Ticehurst & Whistler 1932, Whistler 1936.)

YUGOSLAVIA (59).

(*a*) 1888 Mostar; (1893) Niš, Leskovac, Prokuplje; 1894 Beri, Busovnik, Botun; 1917 Skopje (Usküb), Veles (Köprülü); (1920) Novo Selo (Istip).

(*b*) 1912 Belgrade; 1915 Belgrade-Kalimegdan, Belgrade-Topčider; 1930 Sarajevo; (1931) Nin; 1932 Ljubinje; 1934 Apatin; 1937 Pétervárad, Vukovár; 1938 Ujvidek (Neusatz, Novi Sad), Zenta, Adorjan Szabadka (Subotica), Fehértemplom, Versec, Istvánvölgy; (1939) Benkovic; 1939 Zagreb (Agram), Varazdin, Csantavér, Szeghegy; 1941 Sztapár; 1942 Zombor, Bácsalmás, Ujverbász; (1943) Tetovo (Kalkandelen), Novak (Rudoka, Planina), Peč (Ipek), Hadzarbar, Agino-Selo, Ramanovci, Kumanovo, Tabanovce, Riskovac, Niksić, Piroč, Aleksinac, Stalac, Sikirica; 1943 Vaskapu, Tiszaistvanfalva, Temerin, Pancsova, Hertelendyfalva, Topolya, Magyarkanizsa; 1949 Veglia (Malinska on Krk); 1950 Metkovic, Fiume (Rijeka), Spalato (Split).

(Adamez & Stresemann, Bodenstein 1949, Csornai, Dathe, Dörning 1938 1939, Gebhardt 1941, Keglévich, Keve 1942 1944, Keve & von Udvardy, Kroneisl, Lintia, Mastrovic 1931 1942, Matvejev, Molineux, Nagy 1938, Reiser 1893, Reiser & von Führer, H. Schenk 1939b, Stadler, Stresemann 1920, Szent-Ivány, Wähl 1935 1942.)

HUNGARY (95).

(*b*) 1932 Monor (possible 1920, probable 1930), Berettyóújfalva, Paks; 1934 Székesfehérvár; 1935 Derecske, Bicske; 1936 Kismarja, Keszthely; 1937 Debrecen, Péteri, Vasad, Soltvadkert, Baja, Budafok, Balatonszemes-Rád, Budapest-Kelenföld; 1938 Küllöd, Rákospalota, Zalaapáti; 1939 Dunaböcsény, Békéscsaba, Mátészalka, Miskolc, Csömör, Rákosszentmihály, Mátýsföld, Rákosszentútré, Péstszentlőrinc, Budapest-Mártonhegy, Budapest-St. János Spital, Balatonboglár, Egervár; 1940 Szeged, Szada, Újpest, Pestjuhely, Budapest-Zugló, Sashalom, Budapest-Népliget, Kispést, Dunaharaszti, Budapest-Rózsadomb, Győr, Szobathely; 1941 Szehalom, Érsekcsanak, Cegléd, Gyömrő, Pécel, Budapest-Rákosfalva, Budapest-Kőbánya, Budapest-Tiszviselőtelep, Érd, Nagykanizsa, Fonyód, Balatonföldvár, Tihany, Sopron, Balatonfüred; 1942 Hortobágy, Gyoma, Budapest-Németvölgy, Budapest-Vár, Budapest-Békásmegeyer, Budapest-Tabitófalu (Szent-Endre), Simontornya, Tolna, Kaposvár, Balatonszéplak, Siófok, Tata, Hatvan; 1943 Baranya, Szeged-Fehértó, Pécs, Némethely, Bába, Zsáka, Hajduböszörmény, Jászberény, Békova, Kunszentmiklós, Kecskenét, Vecsés, Budapest-Állatkert, Sárospatak, Atkár, Ecség, Fadd, Pátka, Budapest-Orbánhegy, Budapest-Margit Kórház, Pápa, Magyaróvár, Rajka.

(Adamez & Stresemann, Agárdi, Baranyovits, Beretz, Bezsilia, Dörning 1938 1939, Keve 1937 1942 1944 1948, Keve & von Udvardy, Máté, Nagy 1935 1938, J. Schenk 1944 1944b 1944c, Sólomycs, Sóvágó, Stresemann 1943 1948b, Szent-Ivány, Szlávay, Tarján, von Udvardy 1939 1944, Vasvári.)

CZECHOSLOVAKIA (101).

(b) **1936** Komárno, Hontské Darmoty (? Ipolybogen); **1938** Trnava, Bratislava, Ipolykürt; **1939** Nagyszombat; **1940** Nové Zámky, Nitra; **1943** Michalovec, ěrno, s. of Hodonín; **1944** Nové Mesto, Piešťany, Topoľčany, Kyjov; **1945** Ort Ogyalla, Hnúšťa, Hodonín, Strážnice, Malacky, Myjava, Modra, Sereď, Lok, Levice, Pohorelice; **1946** Košice, Pardubice, Znojmo, Banská Stiaavnica, Svitavy, Moravany; **1947** Moravské Budějovice, Přerov, Lipník, Olomouc, Litomyšl, Kostelec n.O., Jaroměř, Trébechovice, Čáslav, Praha (Prague), Vranov n. Toplou, Velká Bystrice, Uherský Brod; **1948** Velká Bíteš, Ivančice, Hrotovice, Valašské Meziříč, Kolín, Louny, Chomutov, Žilina, Turč, Martin, Trenčín, Prievidza, Blansko, Žďár, Těchonín v Orli. Horách, Chrudim, Litvínov; **1949** Kutná Hora, Toušen n.L., Litoměřice, Bafovo (Batjevo), Muráň, Slavkov u Brna, Holešov, České Budějovice, Police n. Metují; **1950** Liptovský Mikuláš, Krnov, Opava, Skalce n. Svitavy, Boskovice, Jablunko, Ostrava-Radvanice, Teplice-Lázně, Duchcov, Zabuřany, Podbořany; **1951** Sokolnice u Strakonice; **1952** Zvoleň, Okolínko, Huncovice, Velká Lomnica, Strazky, Banská Bystrica, Dolní Kubín, Trutnov, Klatovy, Jihlava, Turnov.

(Bodenstein 1949, Černý, Ferienc, Jany, Keve 1944, Müller-Using; and information from Černý.)

BULGARIA (21).

(a) 1834 Philippopolis (Plovdiv); (1859, 1879) other towns?; 1893 Stara-Zagora; 1919 Sofia; (1920) Odrin; 1930 Burgas; 1932 Petrich, Sveti Vrach, Ruse (Rusčuk); 1935 Ludzene; 1936 Mamopole, Paril, Goteschewo.

(b) **1937** Vidin; (**1943**) Harmanli, Krynowo, Lom-Palanka; **1944** Maraschewo, Ljuta, Lehčeva, Hajredin, Cerven Breg.

(Adametz & Stresemann, Andersen, Belon, von Boetticher 1919 1919b 1937 1941, Dornig 1938 1939, Finsch, Fritwaldsky, Haase, Harrison, Harrison & Pateff, Keve 1937 1944, Nagy 1938, Niethammer 1950, Radakoff, Reiser 1893 1894, Scharnke & Wolf, Stresemann 1920.)

ROMANIA (8).

(a) (1920) Constanza (Kustendji), not in 1893.

(b) (**1933**) Ottenita, Podu-Grosulii (Mehedniti), Darvari, Obrasia, Western Calafat; **1943** Bucharest; **1944** Galatz.

(Adametz & Stresemann, Călinescu, Frank, Keve 1944, Nagy 1938, Otterlind, Reiser 1894, Stresemann 1920.)

U.S.S.R. in Bessarabia (formerly Romania) (2).

(b) **1939** Neu-Borodino; **1940** Akkerman.

(Heer.)

U.S.S.R. in Ruthenia (formerly Czechoslovakia) (4).

(b) **1944** Užhorod (Ungvar); **1946** Beregszász (Beregov, Beregsasy); **1947** Seviš (Nagy-Szöllös), Čop (Csap, Chop).

(Dement'ev, Meklenburtssev.)

AUSTRIA (80).

(b) **1938** Hirm; **1943** Vienna (Wien-Döbling), Wiener-Neustadt, Korneuburg; **1944** Mistelbach, Pomisch b. Frain, Manhartsberg, Feldkirchen, Frauenkirchen; **1945** Graz, Kalsdorf, Klosternuburg, Orth im Marchfeld, Loipersdorf, Wien-Mauer, Wien-Hetzendorf; **1946** Gratkorn, Frohsdorf, Thumersbach; **1947** Glan-Dreieck, Wolfsberg, Sattnitzermoor, Salzburg, Wolkersdorf, Deutsch-Wagram, Gross-Enzersdorf, Himberg, Tullnerfeld, Mödling, Manhartsberg (Pulkau), Krems a.d. Donau, Maria-Tafel, Innviertel, Mühlviertel (Perg), Lassnitztal, Leibnitz a.d. Sulm, Schärding; **1948** Klagenfurt, Spittal, St. Veit, Marchfeld-Stöpfungreuth, Marchfeld-Engelhartstetten, Marchfeld-Groissenbrunn, Marchfeld-Lasseo, Petronell a.d. Donau, Sarasdorf, Margarethen am Moos, Bruck a.d. Leitha, Hainburg, Wolfsthal, Weinviertel, Litschau Waldviertel, Pfifflingberg, Ebelsberg-Traumündung (Litz), Bad Hall, Drosingerwald b. Steyr, Neukamaten b. Piberbach, Frankmarkt a.d. Vöckla, Kainachtal, Maria-Frost, Murau, Feldbach, Fladnitz a.d. Raab, Egelsdorf, Neusiedel a. See, Zurndorf a.d. Leitha, Podersdorf, Lutzmannsburg, Rechnitz, Klosters Tanzenberg, Hörzendorf im Glandrieck, Zöllfeld, Krumpendorf a. Wörther See, St. Andrä i. Lavanttal, Salzburg-Anif, Salzburg-Hallein, etc.; **1949** Villach, Grafenstein, Linz, Steyr, etc., etc.

(Adametz, Keve 1943, Niethammer 1943 1943b, Stresemann 1948, Zimmermann.)

GERMANY (78).

(b) **1945** Pattensen (Springe), Haldensleben (Kreis Oschersleben), Gröningen; **1946** Straubing, Hofheim; **1947** Gut Elmarshausen (Hessen), Augsburg, Soest, Wettin, Oschatz; **1948** Celle, Schluisfelder Mooses (Schleissheim), Hollern (Freising), Trochtelfingen (Aalen), Ludwigsburg, Ansbach, Nürnberg, Fulda, Ingelheim a. Rhein; **1949** Hannover, Neuburg, Mainz, Hiddensee, Braunschweig (Brunswick), Mannheim, Husum, Dreisdorf, Gross-Stenberg (Kreis Grimm), Hockenheim; **1950** Nordhorn, Lüdinghausen i. Westfalen, Herzberg (Harz), Duderstadt, Osterode (Harz), Wolfsburg (Kreis Gifhorn), Heide, Cuxhaven, Dorum, Bremen, Wilhelmshaven-Vossilapp, Töpehn (Kreis Teltow), Prieros, Biesenthal, Leuenberg, Templin (Uckermark), Berlin, Meerane, Sangerhausen b. Lauterberg, Halle (Saale), Paylitz (Kreis Genthin), Köllede, Dresden-Loschwitz, Lausnitz b. Königsbrück, Grosschönau (Kreis Zittau), Frankfurt a. M., Wetzlar, Worms, Aschaffenburg, Dannenberg, Dithmarschen; **1951** Angermünde, Zwickau, Wurzen, Giebichenstein in Halle, Tangerhütte, Köthen, Raguhn, Jena, Lachen (Pfalz), Calvörde (Haldensleben), Radeberg, Dresden-Flauen, Dresden-Kletsche, Dresden-Pillnitz, Dresden-Leuben, Northeim, Bederkesa.

(Bodenstein 1949 1949b 1950b 1951, Buse, Creutz, Desselberger, Dunkelmann, Gebhardt 1950, Grünfeld 1950 1952, Hahn, Heer, Hennings, Hofstetter, König, Kühn, Lüders, Müller, Raube & Focke, H. Schenk 1951, Schmitt, Schweignan & others, Stay, Stresemann 1948 1949 1950 1950b 1951, Witte, Zabel.)

POLAND (5).

(b) **1940** Olesnica (Óls, former Germany); **1949** Kraków (Krakau, Cracow); **1950** Posnán (Posen), Bochnia, Nowy Sacz (Neu Sandec).

(Miczyński, Stresemann 1951, Wirries.)

ITALY (18).

(b) 1944 Caorle; 1947 Trieste; 1949 Saronno; 1950 Budrio, Milano, Lodi, Gallarate, Fagagna (Udine), Portogruaro, Carpi (Modena); 1951 Latisana,¹ Rovigo, Bologna, Correggio, Tradate, Castano Primo; 1952 Gavirate (Varese), Mozzate (Como).
(Bastia, Favero, Frugis, Moltoni 1947 1950 1950b, Sevesi 1950 1950b, Weber; and information from Frugis.)

SWITZERLAND (3).

(b) 1949 Rothrist (Oltingen); 1950 Basel, Zurich.
(Bodenstein 1949 1950b, Feuz, Haller, Lochbrunner.)

FRANCE (2).

(b) 1950 Remomeix (Vosges); 1952 Juniville² (Ardenes).
(Laurent; information from Goethe.)

HOLLAND (5).

(b) 1949 Harderwijk; 1950 Hulshorst, Musselkanaal, Oldebroek; 1952 Amersfoort.
(Bierman, van den Brink, Tjittes 1950 1952; and information from Tekke.)

DENMARK (4).

(b) 1948 Skagen; 1950 Holstebro, Bøvlingbjerg, Nymindégab.
(Jensen, Jørgensen, Poulsen.)

SWEDEN (4).

(b) 1949 Råd (Onsala); 1950 Malmö, Harlösa; 1952 Fjärås.
(Fontaine, Noréhn, Strömberg.)

BRITAIN? (1).

(b) 1952 Manton (Lincs).
(May & Fisher.)

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The literature here listed has, unless marked with an asterisk *, been seen in the original. Many of the papers cited, for instance those of Keve and Stresemann, quote profusely from local European natural history, sporting and outdoor magazines not available in this country. It would be tedious and unnecessary to cite these again.

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¹ Marked as adult near Haldensleben, Saxony, in the same year.

² Marked as a nestling near Halle, Saxony, in the previous year.

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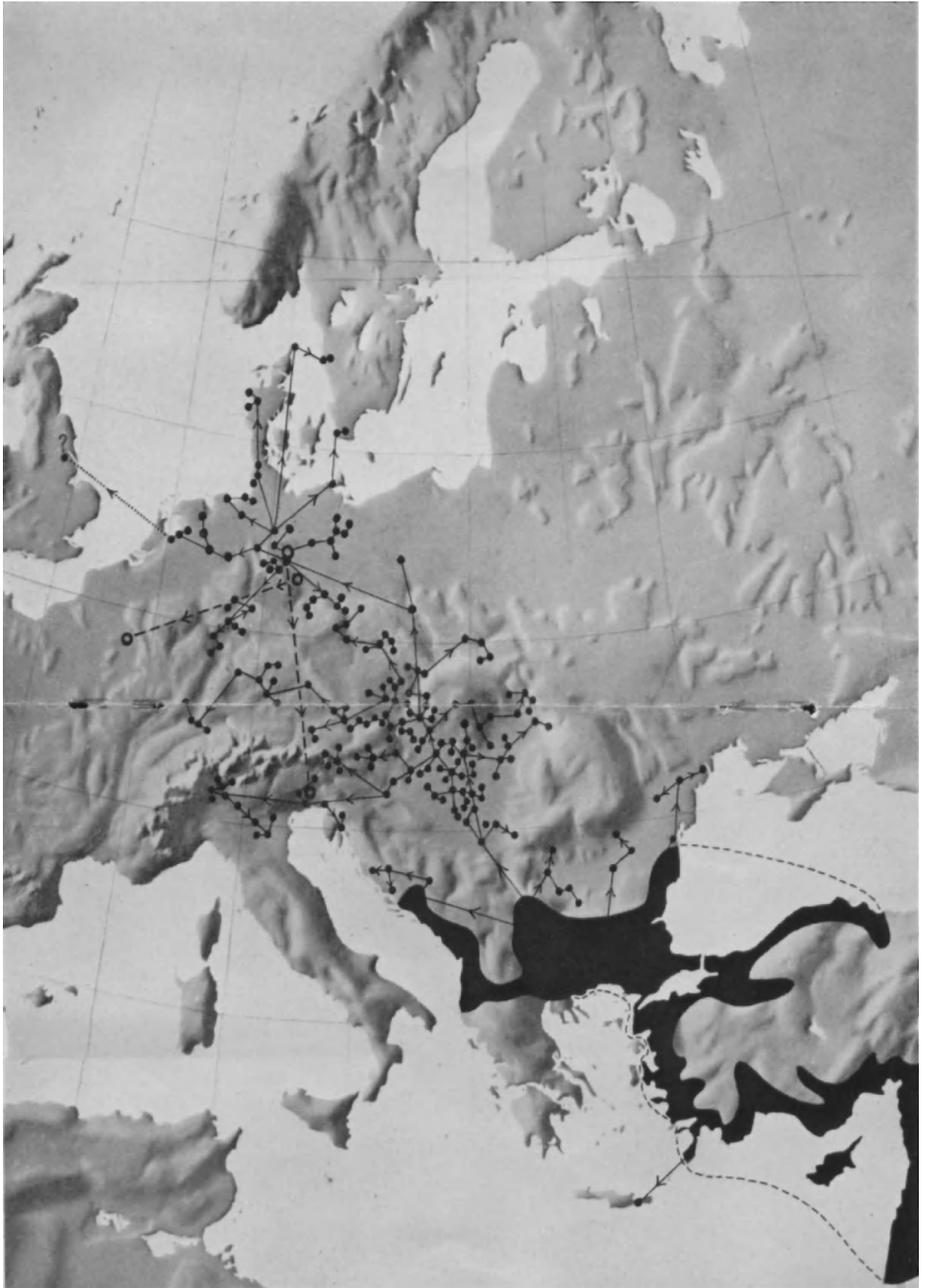
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MAP III: SIMPLIFIED MAP OF THE SPREAD OF THE COLLARED TURTL DOVE (*Streptopelia decaocto*) ACROSS EUROPE, PLOTTED ON A RELIEF OUTLINE, SHOWING THAT THE NORTH-WESTERLY INFILTRATION HAS PROGRESSED THROUGH THE PRINCIPAL VALLEYS AND MOUNTAIN-BREACHES.

The shaded area represents that occupied by c. 1900. Unbroken lines connect spots with nearest places at which previously recorded. Broken lines connect origin- and recovery-spots of the two ringing returns.