

BIRD MIGRATION

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After more than 2,000 years of observations climaxed by a century of experimental studies, we are still not certain regarding many facets of migration. We have authentic data on breeding range, wintering quarters and many migratory routes of a large number of birds but we still are not in a definite stage to explain why birds go where they do at the time they do, and their manner of navigation is only partially understood.

Introduction

One of the most spectacular events in the animal world is the migration of birds – the feathered bipeds. It has intrigued mankind for many centuries. It led to such wild speculations that the swallows hibernated in the mud and that some birds flew to the moon for winters. Continuous observations and experiments have dispelled some of these fanciful notions about the life cycle of birds but the many more years will be required to ascertain the how and why of migration. Most of us in India have also noticed the great influx of birds during September to November. The trigger-happy hunters shoot the snipe, geese, teals, ducks, etc., during winter for their table. During the annual royal shoots, thousands of such migratory birds were hunted by the rulers and their guests. In Bharatpur, 4,273 ducks were shot on 12th November, 1938 by Lord Linlithgow, Viceroy of India, along with his 38 gunmen in a single day while 10,437 Imperial sandgrouses (migratory birds) were massacred by King Sardulsinghji of Bikaner, on two days in February 1929 at Gajner.

Larks, leaf-warblers, wagtails, pipits, etc., all seem to pop up suddenly in winter from nowhere. Only a few of us have ever bothered to know as to why this event takes place year after year. Many only think that the birds move because it is in their nature to do so; from where they come, does not concern them and why and how they do it, is clearly the birds' own affair. The migration of birds has been so regular and definite that the Red Indians of Fur countries named their calendar months after the arrival of the migratory birds.

Migratory Movements in Other Animals

Apart from aves (birds), many other animals also show migratory movements. Certain insects, particularly butterflies, undertake regular migration, some going south for winters. Sharp periodicities in the breeding cycles of most amphibians involve short journeys to and from a water source. Many reptiles travel for suitable winter quarters. Among the fishes, the amazing migrations of the eels and salmon are well known. Among mammals, the cyclic outbreaks of

lemmings (a small arctic rodent like rat) are classic; the lemmings, at an interval of three to five years, reach population peaks, apparently compelling them to practice death migrations, sometimes drowning in the sea.

Basis of Bird Migration Knowledge

Modern knowledge of bird migration, although still far from perfect and complete, is based on the following six sources:

- (i) Extensive data available on the distribution of many species in many countries.
- (ii) Direct observations of visible migration by day or of resting birds, at favourable localities.
- (iii) Nocturnal observation of birds attracted to lighthouses and lightships; attraction to light in a particular period (Jatinga in North-East India), or heard (calling over of geese overhead in autumn and spring) or seen through telescope while crossing the face of the moon (moon watching in America).
- (iv) Observation of migrants (day or night) on radars.
- (v) Ringing of individual birds by bands of metal or plastic.
- (vi) Experiments on birds especially on pre-migratory restlessness (development of a particular metabolic or physiological condition called 'Zugdisposition' by Europeans.)

Definition

Migration in a broad sense as defined by Cahn (1925) is "a periodic passing from one place to another". The most commonly accepted definition

now is. "Regular movement of birds between *alternate* areas inhabited by them in different times of the year, one area being that in which the birds breed and the other being an area better suited to support them in the opposite season. A. Landsborough Thomson, an eminent ornithologist, describes Bird Migration as "Change of habitat periodically recurring and alternating in direction which tends to secure optimum environmental conditions at all times." It is the back and forth movement that is the crucial feature of bird migration. The periodic invasion of locust swarms (*tiddi-dal*) is not migration for they do not entail a return to the starting point; it is just an overflow movement. Thus march of locust army differs markedly from the seasonal return traffic taking place among birds. According to celebrated ornithologist Padma Vibhushan late Dr. Salim Ali - Father of Indian Ornithology — the 'Pendulum-swing' movement is noticeable in some other groups of animals as well, but it has reached its rhythmical climax in birds.

Nature and Extent

Most birds migrate; some may go only a few thousand metres while others may travel thousands of kilometres. The longest migratory journey is performed twice in a year by the Arctic Tern, *sterna macrura*; it migrates in winter from the Arctic and goes south right across the world to Antarctica and back again in summer, the distance being 17,600 kms one way. It breeds up to 82°N latitude and reaches 75°N latitude in its off season. Some birds in the high altitudes are sedentary, i.e., they do not migrate. The birds that stay during their migratory journeys at a definite place are known as true migrants while those

passing at a place in autumn or spring are termed as autumn or spring passage migrants respectively. Some birds breeding in high Himalayas in summer have to come down to valleys or foothills to escape severe winters and the descending snow line. There is an exception to it. In Dead Sea area, some birds breed in the warm valley about 300 m below sea-level and come to the adjacent hill country during winter. It is also another exception to the axiom of Nature that the birds always nest and breed in the colder portion of their migratory range.

Advantages of Migration

As seen above, migration involves occupation of two different areas by the bird, at the respective season, favourable in each. It implies a swing from a breeding or nesting niche in the bird's home to a feeding or resting place in its winter quarters. The absence from high altitudes during the cold winter weather enables the bird—

1. To escape cold and stormy weather.
2. To tide over conditions reducing availability of food (due to freezing of water and covering of feeding grounds by snow).
3. To avoid short daylight hours for searching food.

Similarly, return to high altitudes in the summer hot weather provides the distinct advantage of—

1. Making available large uncongested expanse of land for nesting.
2. Abundant food supply due to luxuriant growth of spring plants.
3. Longer hours of daylight for searching food much needed for the young ones.

Migratory Routes

Migration, in its more extensive form, essentially means a change in altitude; the general trend, therefore, is north to south. It is often considered that the birds take straight and definite routes.

Maps suggesting migration routes based on the recoveries of ringed birds could also be misleading, particularly when they are banded and captured only at their breeding and wintering centres or vice-versa. Birds ringed in Bharatpur have been recovered in (earstwhile) U.S.S.R. in their breeding zone and if this is joined by a straight line or linking line, it gives, what is known as, 'Primary Direction'. The actual migratory route is, however, far from straight and is often modified according to feeding ground, weather conditions and topographical features. Occasionally, the birds follow a curve and at times they even take a totally opposite direction for a while. Migratory routes can be differentiated in narrow or multiple flyways. Narrow route is rather uncommon and only a few birds adopt it. Some storks use a long and narrow flyway through Eastern Europe and near east due to their aversion to crossing wide seas.

Most birds prefer to take multiple flyways spreading over a wide area; the width varying with the species of bird and the local conditions. At certain places, these multiple airways may converge due to narrow territory where migrants get funnelled down in dense concentrations. As the passage broadens, the migrants spread once again. Many migrants like to follow low contour routes, rivers, valleys to enjoy flying conditions. Certain tracts strongly repel some birds. Land birds especially passerines (sparrows etc.) hesitate

to cross wide waterways. In certain cases, on reaching shore, they are reluctant to proceed further and change the course, temporarily, to fly along the shore (land) just to delay the inevitable. Sometimes islands lure the birds. Terrestrial birds, after crossing the sea, between the Netherlands and Frision Island fly east west but change the direction to fly along the entire length of these islands. This phenomenon is seen with many birds of Andaman and Nicobar island groups. Land repels sea birds and many sea birds like gulls change their route to avoid land although they could save time and energy. Many birds, however, do not get deterred by the territory over which they fly. Lesser Black-headed Gull from Baltic, crosses entire Europe to reach the Mediterranean Sea and some even proceed to East Africa, crossing the desert. Many ducks and geese such as Mallard cross over the Himalayas from Central India to winter in various parts of north India. The major migration from and to the northern lands (Central Asia, Siberia, Mongolia, etc.) in autumn and spring each year takes place at both ends of the Himalayas, mainly through Indus and Brahmaputra valleys. The migrational stream of land birds such as redstart, buntings etc. converges down the two sides of the Peninsula to Ceylon forming the terminal.

Flight

Birds exhibit astonishing feats during the migrational sojourns.

Speed: Migratory flights are, of necessity, faster than the normal flight speed. Although it is difficult to measure the speed due to wind, etc., some speeds have been worked out as below:

Hawks (like Sparrow, Besra) fly at 50 to 65 kms/hour while waders (ruff and reeve, lapwings, curlew, etc.) cruise at 65 to 80 kms/hour; the ducks (pintails, shovellor, pochards, etc.) and geese (gray lag, bar-headed, etc.) fly at 80 to 100 kms/hour.

Duration: A bird's flying day or night stretches over 6-11 hours, and migrants cover long distances in this manner and then they come down to rest and feed. Some interesting features of a single hop of birds are 1. Coot – 250 kms; 2. Stork – 240 kms; 3. Woodcock – 450 to 480 kms; 4. Plover (Golden plover) – 880 kms (with the flying period of 11 hours).

Birds migrate by day or night and are termed as diurnal or nocturnal respectively. Most of the smaller birds, essentially insectivorous like bee-eaters, fly-catchers migrate at night so that, in day, they may catch insects as well as take rest. Small song birds as thrushes, larks, etc., are also nocturnal. Swallows and swifts, which feed on wing, migrate by day. Hawks, rollers and most birds of prey (falcon, harriers, eagles, etc.) also are diurnal. French ornithologist Jean Dorst (1962) says "in some instances, migrants must cover long distances without a break. Land birds flying from Scandinavia to Great Britain fly 220 to 400 miles non-stop. The Eastern Golden Plover (*Pluvialis dominica fulva*) makes its 2,400-mile trip non-stop from Nova Scotia to South America in about 48 hours. This bird lives in West Alaska and North East Siberia and is a regular visitor to the Hawaiian Islands." This plover is also a winter visitor to India. The snipe *Capella hardwickii* – which breeds only in Japan and spends winter in

Eastern Australia and Tasmania must habitually fly 4,800 kms non-stop over the sea because it has never been seen in between.

Distances: Long distance flier in India is the wood-cock (*Scolopax rusticola*). It breeds in the Himalayas and winters in the Nilgiris and other hills of South India and since this has not been recovered or seen anywhere, it must travel at least 2,400 kms non-stop. A knot, *Calidris canutus*, ringed in England was recovered seven days later in Liberia at a distance of 5,600 kms. Similarly a Ruff and Reeve with the ring number B 4223 of Bombay Natural History Society, ringed in Bharatpur on 9 October 1967 was recovered in May '68 in Yakutian (USSR) at a distance of 5,850 kms.

Height: It was thought that the birds in their migratory flight always flew at high altitudes but recent studies show that night flights are made at low elevations; generally at 1000 m above mean sea level and on cloudy nights, the birds fly at very low heights. Birds flying along sea habitually remain low because the obstacles are rather non-existent. There are many birds which fly very high. A Mallard (Nilsir - *Anas platyrhynchos*) got killed by an aircraft at an altitude of 6,437 m. Lapwings are known to cross mountains at 2,590 m, cranes at 4,572 m. The highest recorded altitude at which the birds migrate is probably of geese (*Anser* spp.) crossing the Himalayas at 8,839 m; almost equal to the Mount Everest height. Crow like bird, though, followed Sir Edmund Hillary up to 7,772 m to 8,200 m during his ascent to Mount Everest in May 1953. The Everest expedition also met birds like crows, griffon vulture and mountain finches at 6,400 m to 7,000 m. Observations with the help of radars have shown that birds migrate at 7,500 m in large flocks, without there being any apparent physical compulsion for

them to take such heights. In spite of the numerous observations, studies, etc., we are still conjecturing on the migration aspects of the birds.

Orientation

We are still probing in the dark as to how the birds orient themselves during migration. It is, however, now agreed that the birds can orient themselves by sun in the day and by stars and moon in the night. Cloudy day or night often mislead the migrants. Generally the migratory flights commence before nightfall or in the early morning supporting the theory of sun orientation. In Bharatpur, it has been regularly noticed that the migratory geese and ducks come in long V-shaped fashion and even the cormorants on their daily feeding flights outside the Keola Deo National Park in Bharatpur move in a V-formation. Pelicans and Siberian cranes fly spirally over this park, giving loud calls to collect their group members before migrating away.

Number in Migration

Some birds may migrate individually like birds of prey or in a scattered association but they continue their touch with each group by yelling frequent calls. Other birds like ducks, geese, passerines, shore birds move in close formations. It was noted that all the Greater Snow Geese, 70,000 in number, stopped in a strip of marsh along St. Lawrence in 1957 on their journey to the Atlantic coast.

Punctuality of Migrants

A few birds are very specific in selecting their breeding site year after year. There is the classic example of swallows in Europe, where they return to the same locality but even to same nesting site in the same building every year after covering over 9,500 kms each way. In our country, a ringed Wagtail (*Motacilla caspica*) was found to occupy the particular lawn (not bigger than a badminton court) in Greater Bombay on almost the exact date in September for five years continuously. An Orphean Warbler (*Sylvia hortensis*) which was ringed in Saurashtra (Kathiawar) in September one year, was recaptured in the nets on the self-same acre or two in the same month, almost to the date, in the next year and in one case, even in each of the three successive years. It must not however, be lost sight of that the regularity and accuracy of return of the migrants is largely dependent upon the availability of food and shelter in that particular locality in that particular year besides the climatic conditions obtaining in the breeding and wintering zones.

Many birds, it seems, are very instinctive as well for they will come to the same place inspite of the impending dangers to their survival, confirming that in crisis, intelligence admits defeat but instinct knows only death. Some chicks which were separated from their parents and did not accompany them to the wintering quarters, also exhibited the instinctive restlessness during the migratory season and some of them did reach the breeding zone and joined their parents.

Conclusion

After more than 2,000 years of observations, climaxed by a century of experimental studies, we are still not certain regarding many facets of migration. We have authentic data on breeding range, wintering quarters and many migratory routes of a large number of birds but we still are not in a definite stage to explain why birds go where they do at the time they do, and their manner of navigation is only partially understood.

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