The orientation of vagrant passerines on the Faeroe Islands, September 1984

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(Med et dansk resumé: Orienteringsforsøg med nattrækkende småfugle på Færøerne i september 1984)

Introduction

In a sense all continental migrants appearing on the Faeroes are vagrants/rarities, and as discussed by Rabøl (e.g. 1975b, 1976, 1978) the orientation and distributional patterns of such birds have considerable interest in the study and understanding of the orientation programme of migrant birds.

This view was the main reason (and excuse) for a visit to the Sumba/Akraberg area on Suduroy, the southernmost part of the Faeroes, during 15 to 30 September 1984.

As revealed by a preliminary investigation in the autumn of 1982 (Bloch & Sørensen 1983), a number of continental migrant passerines may visit this area – when the meteorological conditions are appropriate, i.e. during periods when easterly winds are prevailing.

All these migrants are outsiders far to the NW of the normal migratory paths of the species/populations considered, and one may ask several questions: From where are these vagrants originating? What is the orientation when leaving the continent, when crossing the Atlantic Ocean, and when departing from the Faeroes? Are the birds aware of their off-path position on the Faeroes? Is compensatory orientation/migration carried out? We tried to answer some of these questions, especially by means of orientation experiments with trapped birds.

Material and methods

A total of 108 birds were trapped and ringed in the period 17 to 29 September (Tab. 1). We used 10 mistnets (6 × 6 meter and 4 × 3 meter) which were placed in the bushy gardens of Sumba (4), and on an abandoned cemetary covered with high grass and sorrel (*Rumex* sp.). The nets were opened at sunrise and operated for 7 to 10 hours.

The birds were held singly in pails and fed on mealworms. The birds were caged for one or a few days.

The birds were tested in Emlen-funnels using the typewriter correction paper modification (Rabøl 1981). The amount of activity was designated nil, small, medium or large. The orientation was classified as dis-orientation (random, uniform), unclear, fairly clear or clear. Sometimes the orientation was bimodal, and normally the activity in one of the peaks was clearly dominant. The direction of the orientation was estimated to the nearest 5° (0°, 5°, 10°, 15°,...,355°). Fig. 1 should be consulted for further information.

The experiments were carried out above the village and shielded against horizontal light glows. The following experiments were performed:

19 September (21^{40} to 23^{50}): The sky was overcast but sometimes a few scattered stars were visible. It was nearly calm. The experimental birds were 2 Willow Warblers (trapped 18 Sep.) and 1 Whitethroat (trapped 19 Sep.).

20 September (21^{20} to 22^{40}): The sky was overcast with occasional showers. The wind was southerly and variable in strength. The experimental birds were 3 Willow Warblers (the same 2 as on 19 Sep., plus a new one trapped 20 Sep.).

During the next three nights the weather was stormy and rainy, and I tried some indoor experiments with 8 birds on both 22 Sep. and 23 Sep. However, I had serious problems with the establishment of a uniform illumination, and the activities were mostly small or zero. Reliable results hence were not obtained.

24 September (22^{00} to 24^{00}): The cloudiness varied between 2 and 8/8 (mostly 6 to 8/8). The wind was from the NE and fairly strong. Twice the experiments were interrupted by showers (for a total of about 20 minutes), and we had to cover the funnels. The birds were also briefly exposed to a beautiful northern light. In spite of all these disturbances the birds oriented well. The experimental birds were 4 Blackcaps (3 trapped 21 Sep., and one 24 Sep.), 1 Garden Warbler (trapped 24 Sep.), 1 Lesser Whitethroat (trapped 22 Sep.), 1 Redstart (trapped 23 Sep.), and 1 Red-breasted Flycatcher (trapped 24 Sep.).

25 September (21^{30} to 22^{15}): The cloudiness varied between 4 and 8/8. The wind was from the NE and fairly strong. Several showers occurred, and at last the experiments were closed because of steady rain. The experimental birds were 2 Blackcaps (trapped 24 and 25 Sep.), 3 Garden Warblers (all trapped 24 Sep. - and one of these, no. 61, also in experiment on 24, 26 and 27 Sep.), 1 Whitethroat (trapped 25 Sep.), and 2 Lesser Whitethroats (trapped 22 Sep.).

26 September (20^{50} to 22^{10}): The sky was overcast, and the wind was easterly about 3 Beaufort. The experimental birds were 1 Blackcap (trapped 24 Sep. - and also in experiment on 24 Sep.), 5 Garden Warblers (3 trapped 24 Sep., and 2 trapped 26 Sep. The three former were all in experiment also on 25 and 29 Sep.), 1 Yellow-browed Warbler (trapped 26 Sep.), and 1 Redstart (trapped 26 Sep.).

The next two nights the rain was pouring down, and outdoor experiments impossible to carry out.

29 September (20^{45} to 22^{05}): The cloudiness was 2 to 4/8 until 21^{30}, and then 7-8/8. During

Tab. 1. Ringed birds at Sumba/Akraberg 17-29 Sep. 1984. The 5 species denoted with an asterisk are probably all of local/Faeroese origin. The Tennessee Warbler (trapped on 21 Sep.) is a nearctic vagrant (probably originating in Canada), and the remaining 39 individuals are all of continental origin, except perhaps the Snow Bunting which could be an Icelandic (or Faeroese) bird.
Ringmærkede fugle i Akraberg/Sumba området fra 17. til 29. sept. 1984. De 5 arter udstyret med en stjerne er lokale Sumba-fugle – eller ihvertfald færøske fugle.

Species	Number
Tree Pipit *Anthus trivialis*	1
Meadow Pipit *Anthus pratensis**	5
Rock Pipit *Anthus spinoletta**	15
Wren *Troglodytes troglodytes**	11
Dunnock *Prunella modularis*	2
Redstart *Phoenicurus phoenicurus*	2
Barred Warbler *Sylvia nisoria*	1
Lesser Whitethroat *Sylvia curruca*	3
Whitethroat *Sylvia communis*	2
Garden Warbler*Sylvia borin*	5
Blackcap *Sylvia atricapilla*	9
Yellow-browed Warbler *Phylloscopus inornatus*	4
Willow Warbler *Phylloscopus trochilus*	5
Red-breasted Flycatcher *Ficedula parva*	1
Starling *Sturnus vulgaris**	5
House Sparrow *Passer domesticus**	34
Siskin *Carduelis spinus*	1
Tennessee Warbler *Vermivora peregrina*	1
Snow Bunting *Plectrophenax nivalis*	1
Total	108

the first period the Polar Star, Cassiopeia, the Big Dipper and even the Milky Way were clearly visible. The wind was southerly 2 to 3 Beaufort. The experimental birds were 2 Blackcaps (trapped 27 and 29 Sep.), 4 Garden Warblers (3 trapped on 24 Sep., and 1 on 26 Sep. (also in experiment that night)), 1 Barred Warbler (trapped 27 Sep.), and 1 Redstart (trapped 26 Sep. and also in experiment that night).

In summary, a total of 38 outdoor experiments were carried out, including 26 individual birds, mostly Blackcaps (8) and Garden Warblers (5).

Results

The experimental results are shown on Figs 1-2.

The Blackcaps are oriented very clearly towards SW-WSW, and no compensatory orientation (towards E-SE) is carried out.

The Garden Wablers show more directional variation – also within the same individual. Most orientation is between SSE and SSW in the »standard direction«, but bird no. 61 is easterly oriented on 25 Sep. (60°), 26 Sep. (90°), and 29 Sep. (120°). The easterly orientation may be interpreted as a compensatory reaction. The southeasterly peak of the bimodally oriented bird no. 57 on 29 Sep. may also be explained as compensatory.

The remaining species show the same general tendencies as the Garden Warbler. The bimodal orientation of the Barred Warbler with a strong (compensatory?) major peak towards E-ESE (100°), and a less pronounced (reverse?) peak towards NW is of particular interest.

Both in case of the Garden Warbler and the remaining species the orientation between WNW and NNE may be termed reverse or reverse compensatory.

In summary, just two birds, a Garden Warbler and a Barred Warbler, are displaying clear compensatory orientation – according to the subjective judgement of mine. The great majority of the birds are showing uncompensated orientation in the »standard direction sector«.

These results are surprising – at least to me.

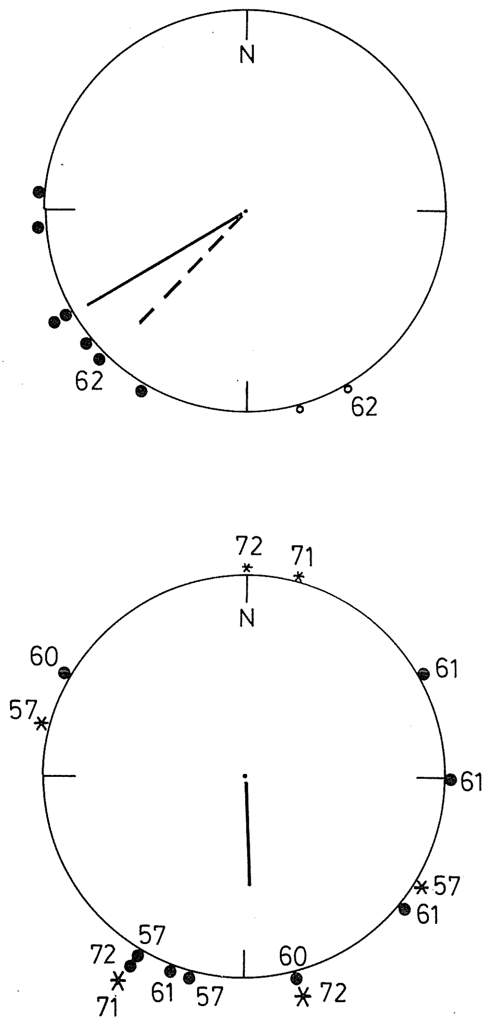

Fig. 1. The upper figure shows the orientation of the Blackcaps. A small dot designates small activity, a large dot medium or large activity. Bird no. 62 was tested twice. The sample mean vector of the 7 large dots is 241° – 0.93 ($P<0.01$, Raleigh-test). The hatched sample mean vector of all 9 dots is 224° – 0.78 ($P<0.01$). The lower figure shows the orientation of the Garden Warblers. Most birds were tested more than once (cf. the numbers). A bimodel activity-pattern is denoted by either a large and a small asterisk (if one of the peaks is clearly dominant), or by two medium-sized asterisks. The sample mean vector of the 11 large dots and asterisks is 178° – 0.55 ($0.01<P<0.05$).
Øverst ses orienteringen af Munk og nederst orienteringen af Havesanger. I nogle tilfælde – og især hos Havesanger – er der lavet mere end et forsøg med den samme fugl. Sådanne fugle er angivet med de sidste to cifre i ringmærknings-nummeret.

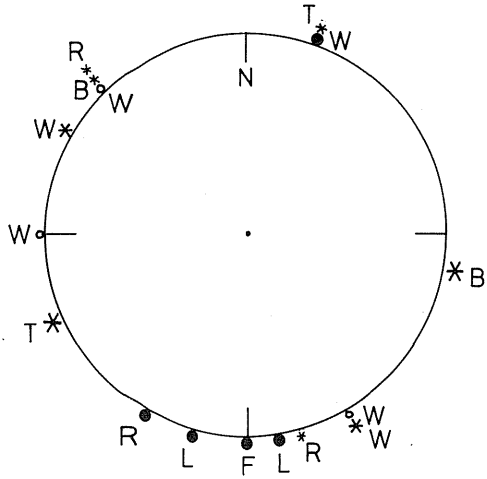

Fig. 2. The orientation of the remaining species. T = Whitethroat, L = Lesser Whitethroat, B = Barred Warbler, W = Willow Warbler, R = Redstart, and F = Red-breasted Flycatcher.
Orienteringen af Tornsager (T), Gærdesanger (L), Høgesanger (B), Løvsanger (W), Rødstjert (R) og Lille Fluesnapper (F).

The physiological condition of the birds

Unfortunately the trapped birds were not weighed – and the fat class not estimated – but in general the birds seemed in a good physiological and behavioural condition. No starved birds were observed or trapped (such birds are sometimes fairly common at Christiansø in the Baltic Sea – both during spring and autumn migration). However, many of the birds were resting in the same restricted place for several days, indicating the need of feeding and fuelling before departure – and perhaps a confused orientational state. The amount of insect-food seemed high – especially in the grass, herbs (*Rumex* sp.) and potato-fields. I cannot imagine the birds had any problems finding food enough, except during the stormy and rainy days.

It should be emphasized that continental migrant passerines arriving to the Faeroes are (probably) not prepared for longdistance migration. When migrating through Scandinavia and Central Europe, the fat-ratio rarely exceeds 0.15 - 0.25, corresponding to 3-5 g of fat in a Blackcap. When arriving to the northern Mediterranean area many migrants, such as the Garden Warbler, rest and feed for weeks, raising their fat-ratio to 0.40 – 0.50. In such a fatty condition the birds are able to cross the Mediterranean/Sahara in a long non-stop migratory step.

The shortest distance between the Faeroes and the continent (Norway) is about 700 km, and this distance has to be covered in a single step. If the airspeed of a Blackcap is 35 km per hour, and the fat-consumption during active flight 0.2 g per hour (Alerstam 1981), it takes about 20 hours and requires 4 g of fat to cover this distance (provided the wind-vector is zero). As a matter of fact, we have to expect fairly lean and light immigrants to the Faeroes – except in tail-winds between NE and SE. It seems more or less impossible for a small passerine to reach the Faeroes under conditions of steady headwinds between SW and NW. Weather maps from the Meteorological Institute in Copenhagen show that S and SE-winds prevailed between Norway and the Faeroes on most days between 13 and 29 Sep. Between 22 and 26 Sep., however, the wind was more to the E or NE, and sometimes the wind was westerly in the close vicinity of the Faeroes. The conditions for a large-scale immigration of birds in a good physiological state thus seem to have been present.

Discussion

Several causes/processes may be responsible for the arrival of autumn-immigrants to the Faeroes:

a) *Reverse migration* because of orientation opposite to the normal migratory direction of the species/population considered (Fig. 4). As described by Rabøl (1976), reverse orientation/migration is probably the major process responsible for the occurrence and distribution of Red-breasted Flycatcher, Barred Warbler and several eastern *Phylloscopus*-warblers within the British Isles and the Nordic Countries. As the initial departure direction of many British and Norwegian populations seems to be E of S – also in species like Robin and Pied Flycatcher, which later on migrate SSW or SW on the continent – there seems to be an appropriate pool of birds which may eventually reach the Faeroes through reverse migration.

b) *Wind-drift* – especially in connection with dis-orientation and strong wind forces. If the windspeed-vector is exceeding the airspeed-vector of the bird, the track-vector should be more or less following the wind. Furthermore, and according to the expectation of Williamson (e.g. 1965), migrating land birds over the sea may loose or give up their orientation and switch to an alternative programme saying: »Go downwind«. The survival value of such a response should be to escape an inhospitable zone/situation as fast as possible (downwind-migration increases the ground speed to a maximum).

c) *Un-compensated migration on the right side of the 'standard direction'.* The 'standard direction' of a population has to be considered as a mean direction with a certain variance/scatter (Fig. 4). If the 'standard direction' of a certain population, say the Swedish Garden Warblers, is SSW, some individuals are oriented/migrating SW and a few also WSW. Such birds on the right side of the general/mean SSW-course are constituting a potential source of immigrants to the Faeroes – especially if wind-drift towards W, prior to the arrival to Western Norway and following the departure from here, is not corrected for. Of course, migrants breeding in Western Norway and endowed with a 'standard direction' W of S are particularly vulnerable to drift towards west under conditions of easterly winds.

After the arrival to the Faeroes several kinds of reactions/orientations may be imagined:

d) The departure direction could be *unaltered* – e.g. NW in a Barred Warbler having arrived on reverse migration, or SW in a Swedish Garden Warbler having arrived because of b) and/or c).

e) The geographical displacement towards NW may be perceived by the bird, and the departure orientation should be in the sector between E and SSE in order to *compensate* the displacement.

My expectation prior to the orientation-experiments on the Faeroes was that the source of most immigration should be reverse orientation (a) combined with wind-drift (c), and that most departure-orientations on the Faeroes should be compensatory (e).

As revealed by Fig. 1, however, only a minor part of the orientation on the Faeroes was compensatory. Furthermore, the 'high' number of Blackcaps (Tab. 1) and their clear SW-WSW-orientation seemed at first very puzzling (the Blackcap is one of the most common autumn immigrants to the Faeroes. Sørensen (pers. comm.) observed 16 Blackcaps during 3 to 5 Oct. 1984 on the Northern Isles of the Faeroes, and a total of at least 45 birds were seen in the Sumba/Akraberg-area during 18 Sep. to 11 Oct. 1982 (Bloch & Sørensen 1983)).

At first I could not find/imagine an appropriate population close to the Faeroes producing so many Blackcaps on SW-orientation (of course, the alternative was that the SW-orientation was spurious – produced by some local Faeroese disturbance such as an unevenly distributed horizontal light glow. However, I do not believe in such a possibility because of the shielding and the difference between the Blackcap and the other species).

I recalled the recovery maps of Williamson (1964) and Zink (1973) which produced a picture of Norwegian, Swedish and Finnish Blackcaps (and Central-European birds E of a longitude 10° – 15° E) migrating SE and SSE in the autumn. SW-migrating populations were found in Denmark and Western Europe. The British birds were migrating SSE or S at departure before bending SW on the continent.

I then consulted the Norwegian ringing reports (e.g. Holgersen 1980) in the hope for a possible solution.

Fig. 3 denote the recoveries of Norwegian Blackcaps banded in the breeding season or during the autumn. Only recoveries from the same autumn/winter are included. About half of the recoveries show a W of S orientation, and the 6 British records constitute a relatively high proportion, especially compared to Norwegian populations of e.g. Robin, Willow Warbler and Garden Warbler which seem to avoid emigration across the North Sea (recoveries later in the autumn are found in France and on the Iberian Peninsula).

The tentative conclusion is that a significant proportion – maybe most – of the West-Norwegian Blackcaps have an autumn departure 'standard direction' W of S. In addition the Blackcap may be 'fearless' of crossing the sea and easily drifted by the wind, resulting in W-tracks from Norway in winds between E and SE.

Conclusion

Fig. 4 constitutes a simple model which describes the orientation of the vagrants prior to the arrival to the Faeroes. Most species arrive on reverse migration (WNW to NNW), but the

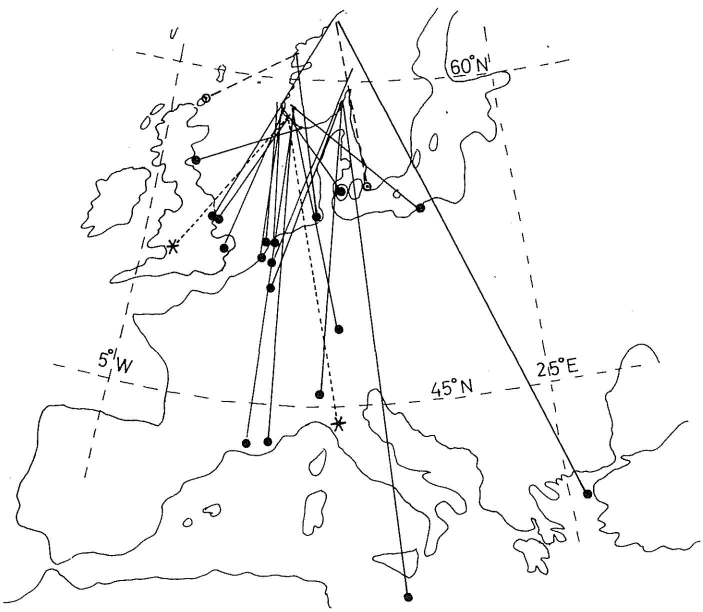

Fig. 3. Recoveries of Blackcaps ringed in Norway. Three categories are distinguished: 1) Birds banded during Sep./Oct. and recovered the same autumn (Dec. incl.). These recoveries are denoted by black dots and fully drawn lines. 2) Birds banded during Sep./Oct. and recovered in Jan. (stars and dotted lines). 3) Birds banded in July (at or near the breeding place) and recovered the same autumn (open circles and hatched lines).
Norwegian Blackcaps recovered during later autumns or springs include birds from Spain over Italy to Turkey/Lebanon.
The recoveries were found in lists of birds ringed in Norway published by Holgersen (e.g. 1980, 1982) and Runde (1984).
Genfund af Munke ringmærket i Norge. De sorte prikker henviser til fugle ringmærket i sep./okt. og genfundet samme efterår (til og med dec.). Stjernerne viser efterårsfugle genfundet samme vinter i jan., og de to cirkler med prik i midten genfund fra efteråret af fugle mærket om sommeren (juli) på eller tæt ved ynglepladsen.

Blackcap in particular on (wind-assisted) normal migration.

As already mentioned the great majority of the experimental birds showed uncompensated orientation in the 'standard direction'. The question is whether this is a natural/normal response of free-flying birds or spuriously influenced by the experimental conditions.

First, orientation in the 'standard direction' – perhaps in combination with a compensatory component – is probably a normal reaction of a vagrant in an orientation funnel. At Christiansø in the Baltic Sea the Red-breasted Flycatcher is a regular immigrant during September/October, especially in SE-winds. Probably all these birds are arriving directly on reverse migration from the breeding areas E of the Baltic Sea. In 7 orientation experiments during autumn, performed on the night following the immigration, the mean directions were: 98°, 120°, 125°, 134°, 145°, 169°, and 280° (Rabøl 1975a, and unpublished). Just one bird continued on reverse orientation. The remaining 6 birds had shifted to 'standard'/compensatory orientation.

In the natural world reverse orientation/migration could be a much more persistent reaction. Probably, the Yellow-browed Warblers trapped in Sumba have been on a westerly, reverse track for at least one month and 10 steps before reaching the Faeroes.

Furthermore, it seems obvious that the bottom of a funnel under a mostly overcast sky does not offer prime conditions for detection of and compensation for the off-path NW-position. Under these circumstances a stereotype compass-reaction in the 'standard direction' is perhaps to be expected. Nevertheless, the birds have moved to the Faeroes by themselves and have rested for hours and perhaps days before being trapped. There should have been sufficient time for detection of the

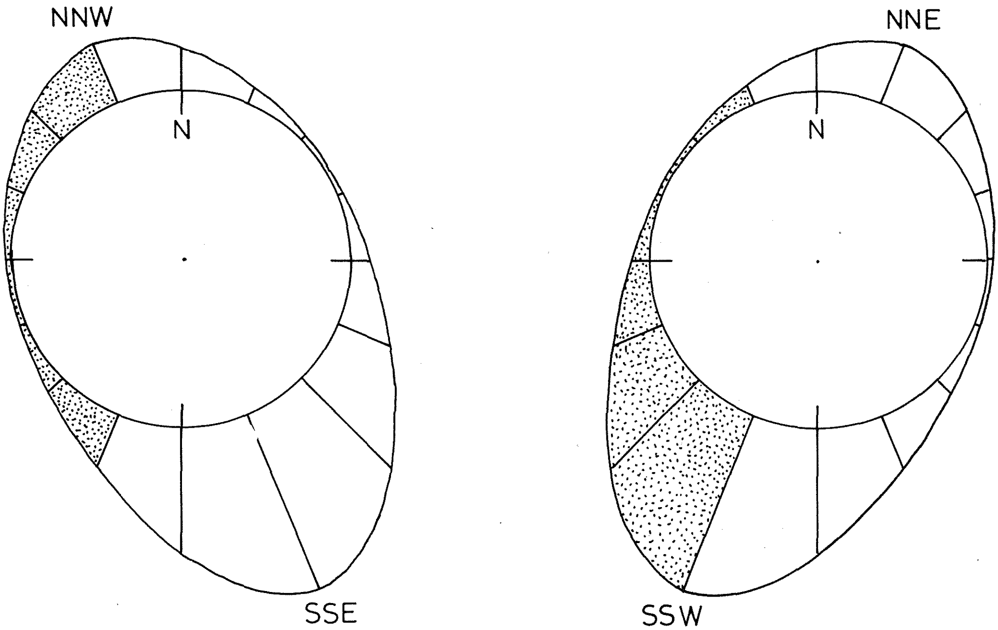

Fig. 4. Two bimodal circular distributions with means around SSE and NNW (left figure) and SSW and NNE (right figure). The left figure could be a model of the directional probabilities of the Norwegian Garden Warblers – or East-European Barred Warblers (first part of the autumn migration): Most birds are orienting around SSE, but a reverse minor peak is found around NNW. Birds starting from western Norway in directions within the dotted sector have the possiblity of reaching the Faeroes. Birds on reverse migration constitute the major part of these arrivals (in the hypothetical distribution denoted. Of course in real life both the ratio of reverse migrants and the directional variance may be different, compared to the example). The right distribution could be a model of the directional probabilities of most West Norwegian Blackcaps, in which the reverse minor peak is around NNE. In this case the great majority of Blackcaps reaching the Faeroes are birds on normal/'standard' migration (the dotted area).
Model til forklaring af islættet af normaltræk og omvendt træk for de arter/bestande, der dukker op på Færøerne om efteråret. Figuren til venstre kan gælde for norske Havesangere, hvis normaltrækretning for det første stykke vej om efteråret er SSØ. Her vil de fleste færøske forekomster skyldes omvendt træk. Figuren til højre kan gælde for den SSV-trækkende vestnorske bestand af Munke. Disse når især Færøerne på normaltræk - i forbindelse med vinddrift mod V.

displacement and inclusion of a compensatory component in the compass-system. It should be born in mind that trapped migrants displaced by man are normally compensating the displacement (e.g. Rabøl 1975a). During such passive conditions the opportunities for registering the direction and distance of the displacement appear much more difficult. The point probably is that most birds (considered as individuals) ending up on the Faeroes do not feel displaced and/or are not able to compensate a displacement: A persistent defective orientation system is the 'cause' of the vagrancy.

Summary

During September 1984 nocturnal migrant passerines of continental origin were trapped and tested in orientation funnels on the Faeroes. The great majority of the birds showed uncompensated orientation in the 'standard direction', and only a few birds compensatory or reverse orientation.

Acknowledgments

Kim Diget Christensen and especially Søren Sørensen were most helpful in trapping the birds and during the experiments. Dorete Bloch in Torshavn helped with many practical business, including the quartering in Sumba. The staff at Akraberg Lighthouse and many sumbings – especially Andreas Richardt – were also very friendly and helpful. Even the small boys who destroyed 4 nets during the first week ended up as positive spectators to our displays.

Resumé

Orienteringsforsøg med nattrækkende småfugle på Færøerne i september 1984

I sidste halvdel af september 1984 besøgte jeg Sumba/Akraberg-området på Suduroy, Færøerne.

Søren Sørensens besøg i dette område i september/oktober 1982 (Bloch & Sørensen 1983) havde vist, at der her kan raste betydelige mængder af nattrækkende småfugle fra Europa og Asien. Bygden Sumba forekom derfor at være et oplagt udgangssted for fangst af fugle til orienteringsforsøg med tragtmetoden (se Rabøl 1981).

Trækfugle fra Europa og Asien, der dukker op på Færøerne om efteråret, befinder sig langt nordvest for deres normale trækruter, og man kan stille sig flere spørgsmål, bl.a.: 1) Hvad var fuglenes orientering forud for ankomsten til Færøerne?, og 2) hvordan er fuglene orienteret ved afgangen fra Færøerne?

I sidste halvdel af september 1984 var vinden mellem Færøerne og Norge mest mellem NØ og SØ og således fordelagtig med hensyn til vindassisteret tiltræk fra Europa. Vi havde da også meget pænt med rastende nattrækkere i haverne i Sumba. Tab. 1 viser antallet af ringmærkede fugle fordelt på arter (der blev anvendt 6 stk. 6 meter net og 4 stk. 3 meter net i de 13 dage fra 17/9 til 29/9. Der blev således i snit fanget 3 kontinentale nattrækkere pr dag, hvilket egentlig var over forventning).

Arts- og antalsammensætningen i ringlisten og i rastoptællingerne tyder på, at de fleste tiltrækkere er fugle på *omvendt træk* – altså fugle med en orientering modsat rettet normaltrækretningen. Man skal her huske på, at normaltrækretningen ved starten fra Norge af det store flertal af norske ynglefugle er Ø for S – og det gælder også for de arter, der senere hen over Danmark/Tyskland går over til at blive SV-trækkere.

De østlige vinde over havet mellem Norge og Færøerne har så yderligere forskudt trækket i vestlig retning (og forøget trækhastigheden), hvad der er forklaringen på, at så 'store' mængder er nået frem til Færøerne.

I orienteringsforsøgene på Færøerne ville jeg nu have forventet en orientering mellem Ø og S – som en kombination af et normaltræk mellem ØSØ og S og en korrektions-komponent mellem Ø og SØ, der skulle hidrøre fra fuglenes observation af, at de var kommet alt for langt NV-på.

Denne forventning slog imidlertid ikke rigtigt til: De allerfleste fugle viste nemlig ukorrigeret normalorientering.

Især tolkningen af Munkens SV-orientering voldte mig i starten store problemer. Jeg mente nemlig at vide, at norske Munke – som de svenske og finske – var SSØ-trækkere ved starten fra Norge. I så fald burde de enten vise normal og/eller kompensatorisk Ø til S orientering eller omvendt NNV-orientering. En gennemgang af genfund af norske ringmærkede Munke gav imidlertid en rimelig god forklaring på SV-orienteringen: Mange (måske de fleste) norske Munke starter med at trække SSV om efteråret, og de viser ikke – som næsten alle andre arter – tendens til at undgå udtræk over Nordsøen (Fig. 3).

Konklusionen af orienteringsforsøgene på Færøerne er altså, at uanset om fuglene ankommer på (vindassisteret) omvendt træk eller normaltræk (Munk), synes de ude af stand til at korrigere for de opståede fejl eller deres uheldige position.

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