The timing of arrival and departure of the Spotted Redshank *Tringa erythropus* in Finland

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The Spotted Redshank is probably the best example of an "instinct migrant" among the breeding birds of Northern Europe, its time schedule apparently being controlled almost completely by an endogenous circannual rhythm. Its date of return is highly predictable (e.g. at Helsinki on 1—8 May, $N=24$) and within a few days it is present throughout the whole of Finland. Its southward departure starts on average on 10 June ($N=24$), more punctually than in any other Finnish wader. The first birds to depart are females that leave their mates about one week before the young hatch. Small annual differences in the date of departure are associated with differences in temperature on the breeding grounds in late May, which may speed up or retard the early phases of nesting.

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With respect to the factors controlling bird migration, it is customary to distinguish two major groups, so-called "weather migrants" and "instinct migrants" (e.g. Schüz 1971). In the former group, the movements are largely dependent on prevailing weather conditions, while in the latter group migration is determined mainly by endogenous, physiological factors. There is, however, no sharp distinction between these two categories, rather a continuous series from typical weather migrants to genuine instinct migrants.

Perhaps the best example of the "instinct" type among the migratory birds of Northern Europe is the Spotted Redshank: on almost the same date each year it arrives after a long migratory journey from Africa, and with equal predictability it departs again in early June to the south, after spending only a few weeks on the breeding grounds. Weather factors affect this fixed time schedule very little. To illustrate this exceptional stability in the timing of migration in the Spotted Redshank, I present in this paper data on the arrival of the species in different parts of Finland and on the start of the post-breeding departure on the west coast.

Arrival

According to records of the arrivals of migratory birds in the Helsinki area, covering 24 successive years (1947—70), based on the observations of dozens of ornithologists, the first Spotted Redshanks are seen on 1—8 May, on average 4 May ($SD \pm 2.06$). No less than 19 first sightings of the spring fell within five days, 2 to 6 May. In

its punctuality of arrival, the Spotted Redshank is unequalled by any other species. Similarly in the region of Vaasa, another area with reliable data covering a long succession of years, the dates of arrival of the Spotted Redshank during 17 springs are confined to the short period of 2—11 May, average 8 May ($SD \pm 2.44$). The small annual variation in arrival dates is the more noteworthy when considering the unpredictability of weather conditions in early May in Finland — in some years it is very cold, in others as warm as in full summer.

Migration of the Spotted Redshank through Finland is very rapid: in a few days the species has reached the northern parts of the Gulf of Bothnia, and a little later even Lapland (Fig. 1). In fact, the time difference between the southern and northern localities is probably even smaller than indicated in Fig. 1, since the data from Rovaniemi are based on the observations of only a few ornithologists and those from Muonio of one single person. In the speed of its migration through Finland, however, the Spotted Redshank is not unusual, for some other northern waders arriving late in the spring, e.g. Temminck's Stint *Calidris temminckii*, the Red-necked Phalarope *Phalaropus lobatus* and the Broad-billed Sandpiper *Limicola falcinellus*, spread as fast or even faster throughout the whole country (e.g. Hildén & Vuolanto 1972).

The spring passage is of short duration, lasting about two weeks, and terminates quite suddenly, without the occurrence of late individuals so typical of most migratory birds, including waders. On the islands of Valassaaret, for example, the last observation of northbound migrants in each of 17 years has been on 18—30 May, on average 23 May ($SD \pm 3.50$).

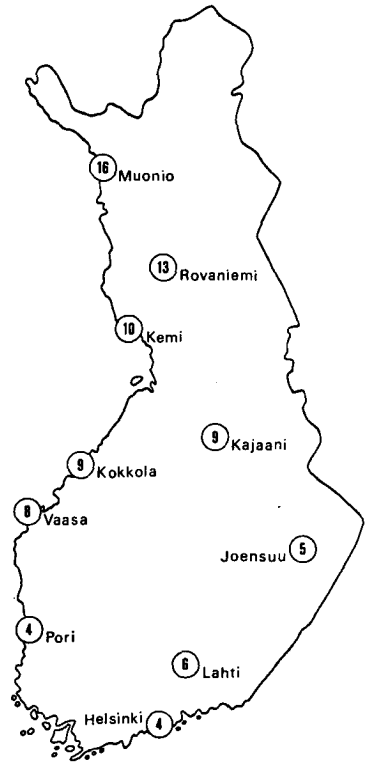

FIG. 1. Mean arrival dates (in May) of the Spotted Redshank in different parts of Finland. The localities, collectors of data and number of years of data (N) are as follows: Helsinki: O. Hildén, $N=24$; Lahti: E. Hietanen, $N=18$; Pori: A. Kaukola, $N=13$; Joensuu: M. Kapanen, $N=8$; Vaasa: O. Hildén & T. Hurme, $N=17$; Kokkola: R. Casén, $N=13$; Kajaani: P. Helo, $N=14$; Kemi: P. Rauhala, $N=13$; Rovaniemi: Komonen (1962), $N=15$; Muonio: Montell (1917), $N=14$.

Departure

The Spotted Redshank starts its regular departure to the south in early June, relatively earlier than any other wader in Finland. (The other two species that commence their southward migration at about the same time, the Green Sandpiper *Tringa ochropus* (Hildén 1961) and the Dun-

lin *Calidris alpina schinzii* (Soikkeli 1967), breed considerably earlier.) The following tabulation summarizes the first sightings of departing Spotted Redshanks during 24 summer of observation in the middle parts of the Finnish west coast. Most of the data refer to observations made by me or my assistants on the islands of Valassaaret, supplemented by five records from Kokkola (1965, 1968, 1971, 1972 and 1975, O. Hildén & H. Hongell) two from Pori (1966 and 1967, M. Soikkeli) and one from Norrskär (1970, O. Hildén) in years when no effective observation was carried out at Valassaaret.

1949: 11 June	1967: 9 June
1951: 13 June	1968: 10 June
1953: 9 June	1969: 15 June
1954: 9 June	1970: 8 June
1957: 15 June	1971: 9 June
1958: 13 June	1972: 8 June
1960: 5 June	1973: 12 June
1962: 10 June	1974: 6 June
1963: 3 June	1975: 14 June
1964: 6 June	1976: 5 June
1965: 14 June	1977: 11 June
1966: 6 June	1978: 9 June

The post-breeding departure of the Spotted Redshank thus started on 10 June ($SD \pm 3.37$), on average, the extreme dates being 3 and 15 June. Usually only lone individuals or 2—4 birds together were seen in the early phase of the southward migration, but a few larger flocks were also noted; e.g. 13 June 1964 8 (Valassaaret, O. Hildén), 9 June 1967 8 (Pori, M. Soikkeli) and 12 June 1979 27+21+8 (Norrskär, S. Vuolanto). Considering the scarcity of the species, which naturally increases the chance of an atypical date for the first sighting, the start of the departure must be regarded as amazingly well synchronized. Except for the Ruff *Philomachus pugnax*, there is much more annual variation in the time schedule of other waders departing early (Table 1). The observations on the Ruff, however, are not as reliable as those on the Spotted Redshank, as in certain years the interval between the termination of spring passage of birds moving to arctic areas and the start of departure of birds nesting in Finland was so short that the very first southward migrating individuals might have been misinterpreted as late spring migrants and so excluded from the analysis.

The southward departure is as rapid as the northward arrival. The first individuals already appear in southern Sweden in the first ten days of June (Edelstam 1972), and in Denmark, the Baltic coast of Poland and the northern parts of Germany in mid-June (Glutz et al. 1977), i.e. at about the same time as on the west coast of Finland.

Breeding system

As Spotted Redshanks arrive in Lapland in mid-May and are moving south again from about 10 June onwards, their stay on the breeding grounds lasts no longer than three to four weeks. This time is shorter than in any other Finnish breeding bird. The explanation lies in certain special features in the breeding system of the species.

According to the handbooks (e.g. v. Haartman et al. 1963—72, Haftorn 1971, Glutz et al. 1977), the first birds to depart are females. After a short courtship period they lay eggs in late May but, contrary to other species of the genus *Tringa*, leave at least most of the incubation to the males. The females still remain for some time on the breeding grounds and may pair with another male or, in case of nest

TABLE 1. Onset of the southward migration in some early departing waders at Valassaaret in 1949—78.

	Earliest	Mean ± *SD*	Latest	Years
Philomachus pugnax	11 June	16 June ± 3.40	23 June	14
Numenius phaeopus	13 June	20 June ± 4.70	28 June	15
Tringa glareola	13 June	23 June ± 6.20	2 July	15
T. nebularia	15 June	24 June ± 5.31	30 June	13
Calidris a. alpina	20 June	29 June ± 6.37	9 July	17

failure, lay a replacement clutch. There are only two known cases of polyandry (Raner 1972, Danilow & Rjabizew in Flint 1973), but it may occur more commonly than is so far believed. About one week before hatching of the young the females desert their mates, gather into flocks and leave the breeding grounds (see the observations by P. Linkola from Enontekiö in 1965: v. Haartman et al. 1963—72). More detailed studies of the breeding biology of the Spotted Redshank are urgently needed to confirm these suggestions.

Timing of the departure

Evidently, the whole breeding cycle of the Spotted Redshank — arrival, courtship, breeding and departure — is a sequence of events almost completely controlled by an endogenous circannual rhythm. Each event follows the previous one, without any external stimulus. The annual cycle of photoperiod, for instance, can hardly act as the *Zeitgeber*, as in many species, since breeding and departure take place in the continuous daylight of Lapland. Other environmental factors that might operate as a reliable *Zeitgeber* are equally difficult to imagine at this time of the year. However, photoperiod could well initiate the whole machinery during the spring migration, the successive events of the breeding cycle then following each other on the hourglass principle, without any further external stimuli. In this case, the annual periodicity of the Spotted Redshank would be adjusted once a year by photoperiod and subsequently follow an endogenous rhythm. Unfortunately, laboratory experiments conducted in constant conditions to demonstrate the factors governing the annual cycle of the Spotted Redshank would be extremely difficult to arrange.

However, not even the Spotted Redshank follows a completely fixed time schedule. There are small annual differences in the timing of southward departure, which probably result from corresponding differences in the time of breeding (cf. Hildén 1961). These, in turn, are likely to depend on the temperatures in the latter half of May and early June, and the concomitant melting of snow. In some years the conditions permit the birds to start nesting straight after their arrival at the breeding grounds, while in other years cold weather and thick snow cover delay the birds by some days.

To test this idea, I have compared the onset of departure on the west coast with the mean temperature in Lapland during the early phase of breeding. Temperatures were measured at Sodankylä (67°25'N, 26°30'E), close to the centre of the species' breeding range in Finland, during the 20-day period, 16 May to 4 June. Fig.

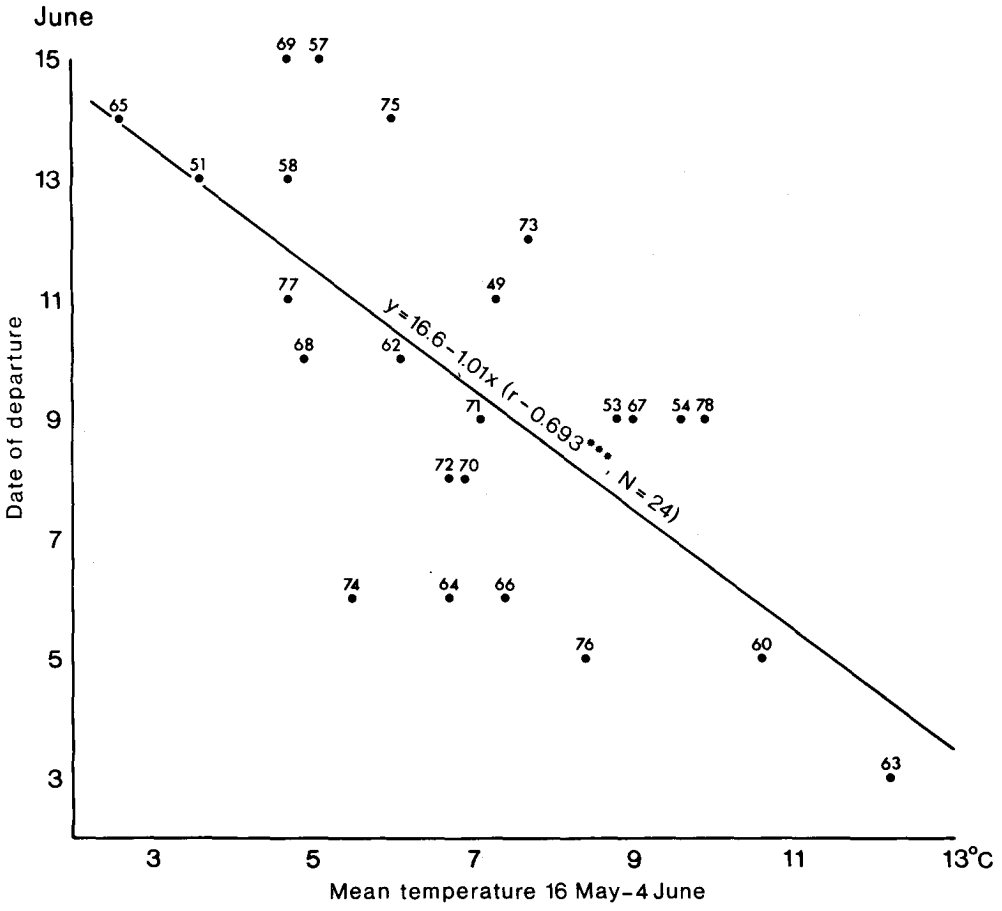

FIG. 2. The relationship between the mean temperature on the breeding grounds (Sodankylä, 16 May to 4 June) and the onset of departure of the Spotted Redshank on the west coast of Finland during 24 summers from 1949 to 1978.

2 depicts the result. The correlation between the temperature at the beginning of the breeding season and the onset of departure is highly significant ($r = -0.693$, $P < 0.001$). Considering that the effect of mere chance on the date of the first sighting of a southbound migrant must be considerable, the relationship between temperature and timing of departure is surprisingly clear.

Hence, we can conclude that although the timing of southward departure in the Spotted Redshank is mainly the result of a circannual program determining the date of spring migration, the small year-to-year variation in departure date is caused by temperatures in late May and early June, which either speed up or retard the early phases of breeding.

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Selostus: **Mustaviklon kevät- ja syysmuuton ajoituksesta**

Mustaviklo on luultavasti kaikkein selväpiirteisin "vaistomuuttajatyypin" edustaja Pohjoismaiden linnustossa. Keväällä se saapuu erittäin täsmällisesti toukokuun alussa, esim. Helsinkiin 1—8.5. (N=24) ja Vaasaan 2—11.5. (N=17). Muutto yli Suomen etenee hyvin nopeasti (kuva 1). Kevätmuutto kestää vain pari viikkoa eikä viivyttelijöitä juuri tavata.

Syysmuutto etelään alkaa sekin hyvin täsmällisesti kesäkuun alkupuolella, suhteellisesti aikaisemmin kuin minkään muun kahlaajamme. Länsirannikkomme keskiosista kootun 24 kesän tilaston mukaan ensimmäiset syysmuuttajat nähdään keskimäärin 10.6., ja äärihavainnotkin jäävät vajaan kahden viikon (3—15.6.) sisään. Muitten varhain pois muuttavien kahlaajien aikataulu vaihtelee vuosittain huomattavasti enemmän (taul. 1).

Ensimmäisinä pois muuttavat mustaviklot ovat naaraita, joiden vierailu pesimäpaikoilla kestää vain 3—4 viikkoa. Ne munivat pian saapumisensa jälkeen, mutta jättävät pääosan hautomisesta koiraille ja lähtevät syysmuutolle noin viikkoa ennen poikasten kuoriutumista. Ilmeisesti mustaviklon koko pesimäkierto Pohjolassa on miltei täysin sisäisen vuosirytmin säätelemä. Vaikka päivänpituus tuskin voi toimia pesinnän ja poismuuton ajoittajana Lapin kesän jatkuvassa päivänvalossa, se silti saattaa käynnistää vuosikierron koneiston kevätmuuton aikana, minkä jälkeen jokainen vaihe seuraa toistaan ilman uutta ulkoista tahdistajaa.

Täysin kiinteää aikataulua ei mustaviklokaan noudata. Pienet vuosittaiset erot poismuuton alkamisessa johtuvat pääasiassa toukokuun jälkipuoliskon lämpötiloista pesimäpaikoilla, jotka eräinä vuosina sallivat pesimään ryhtymisen heti lintujen saavuttua, toisina vuosina taas pakottavat odottamaan muutamia päiviä (kuva 2).

References

EDELSTAM, C. 1972: The visible migration of birds at Ottenby, Sweden. — Vår Fågelvärld, suppl. 7:1—360.

FLINT, W. E. 1973: Fauna i ekologija kulikow. — Moscow.

GLUTZ v. BLOTZHEIM, U. N., K. M. BAUER & E. BEZZEL 1977: Handbuch der Vögel Mitteleuropas. Band 7. — Wiesbaden.

v. HAARTMAN, L., O. HILDÉN, P. LINKOLA, P. SUOMALAINEN & R. TENOVUO 1963—72: Pohjolan linnut värikuvin. — Helsinki.

HAFTORN, S. 1971: Norges fugler. — Oslo - Bergen - Tromsø.

HILDÉN, O. 1961: Über den Beginn des Wegzuges bei den Limikolen in Finnland. — Ornis Fennica 38:2—31.

HILDÉN, O. & S. VUOLANTO 1972: Breeding biology of the Red-necked Phalarope Phalaropus lobatus in Finland. — Ornis Fennica 49:57—85.

KOMONEN, A. 1962: Muuttolintujen saapuminen Rovaniemelle vv. 1947—1961 (Referat: Ankunft der Zugvögel in Rovaniemi 1947—1961). — Ornis Fennica 39:102—112.

MONTELL, J. 1917: Fågelfaunan i Muonio socken och angränsande delar af Enontekis och Kittilä socknar. — Acta Soc. Fauna Flora Fennica 44, 7:1—260.

RANER, L. 1972: Förekommer polyandri hos smalnäbbad simsnäppa (Phalaropus lobatus) och svartsnäppa (Tringa erythropus)? (Summary: Polyandry in the Rednecked Phalarope, Phalaropus lobatus, and the Spotted Redshank, Tringa erythropus.) — Fauna och Flora 67:135—138.

SCHÜZ, E. 1971: Grundriss der Vogelzugskunde. — Berlin und Hamburg.

SOIKKELI, M. 1967: Breeding cycle and population dynamics in the Dunlin (Calidris alpina). — Ann. Zool. Fennici 4:158—198.

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