Brief reports • Tiedonantoja

Chernobyl radiation not the cause of fatally delayed autumn migration of the Swift *Apus apus* in 1986

Esa Lehikoinen & Jussi Lindström

In 1986 hundreds of Swifts were observed in southern Finland and northern Sweden in late October and early November, although the species normally leaves these areas in August (Mikkola et al. 1987, Hildén 1987, Elmberg & Stenström 1987). Many of them were unable to continue their autumn migration. The phenomenon was so conspicuous that laymen, bird-watchers and scientists alike responded to it (see Acknowledgements). Over 100 dead Swifts were collected for closer inspection.

As only six months had elapsed since the Chernobyl reactor accident, suspicion was expressed, especially by the public, that increased radioactivity could be the reason for the abnormal autumn behaviour of the Swift. Recently, this suggestion was presented in Sweden by Elmberg & Stenström (1987). They measured radioactivity due to ^{137}Cs in one Swift and got a reading of 100 (± 30) Bq/kg. Although they stated that the level of activity observed was not different from that observed in other animals (fish, birds, mammals), they, however, speculated that radioactivity should be considered as a possible cause of the Swift episode. They reasoned that even low levels of radioactivity may affect the endocrine control of migratory behaviour. For example, radioactive iodine accumulates in the thyroid, which is a part of the control system.

Because we had started a study of radioactivity in Finnish birds in August 1986, we agreed with the Helsinki Swift study group that also the Swifts collected during autumn could be included in our study.

Altogether 139 Swifts were analysed, one of which was collected in 1983 and the remaining 138 in 1986, after the Chernobyl accident. Most birds were collected around Helsinki in October (76) and November (59). Only two individuals of the 1986 sample were young. The sexes were evenly represented in the sample (65 males, 67 females, 6 unsexed). The radioactivity analyses were made individually from pieces (c. 2 g in fresh weight) of pectoral muscles with a gamma counter from November to January. The decay rate due to ^{137}Cs averaged 182 Bq/kg (SD = 110.0, n = 138). The maximum rate observed was 508 Bq/kg and 61.5% of individual samples showed an increased level of caesium activity at the significance level of 95%. The single observation by Elmberg & Stenström (1987) falls rather close to our mean.

Because it is unknown what levels of radiation and which isotopes have detectable effects on the endocrine system in birds, the reasoning of Elmberg & Stenström remain purely speculative. We do not know enough of the isotopes to which the birds, and the Swift in particular, were exposed earlier in 1986, especially during the spring migration. Yet, we have four arguments against the importance of radiation (at least as far as ^{137}Cs is concerned).

First, the postponed autumn migration has been observed in the Swift at least twice earlier — in 1918 and 1957 (Mikkola et al. 1987). It is probable that radioactivity levels of the environment were not abnormal in these years.

Second, breeding success of the Swifts was normal in 1986 (Hildén 1987) although breeding is also controlled endocrinologically, and partially by the same systems.

Third, abnormal migration behaviour was not observed in any other species although many of them showed higher mean levels of ^{137}Cs radiation. We present for comparison our measurements on such insectivorous passerines, which migrate in spring at approximately the same time as the Swift (Table 1). Most of the data given in the table concern birds collected in May soon after the accident. The ^{137}Cs level decreased in these species by about 50 % by autumn. So, even allowing for the time difference of the samples, most other insectivorous passerines showed higher caesium activity than the Swift. In fact aerial feeders like the Swift were not particularly

Table 1. Mean radiation activity due to ^{137}Cs (in Bq/kg) in insectivorous passerines which migrate in May — June. Standard deviations are given for samples with n > 2. Only birds born in 1985 or earlier are included.

Species	Mean	SD	max	n
Apus apus	182	± 110.0	508	138
Luscinia luscinia	581		865	2
L. svecica	2071	± 3831.8	7818	4
Phoenicurus phoenicurus	692		1167	2
Sylvia curruca	813			1
S. communis	477			1
S. atricapilla	959	± 853.4	1944	3
Phylloscopus sibilatrix	403			1
Ph. collybita	929	± 585.3	1636	4
Ph. trochilus	879	± 905.5	2841	12
Muscicapa striata	401	± 335.9	918	5
Ficedula hypoleuca	722	± 823.8	2826	10
Mean of all samples (excl. Swift)	864	± 1265.3		45

exposed to radiation. The highest ^{137}Cs values were recorded in owls, birds of prey and passerine species, which forage in the canopy of coniferous trees (Lehikoinen et al. 1987).

Fourth, the argument by Elmberg & Stenström implies that the Swifts observed in Västerbotten and Uusimaa in late autumn, and only they, had to be close to Chernobyl at the time of the reactor accident; the content of short-lived isotopes in the air was not high enough to affect the birds elsewhere — let alone the Swifts only. We regard this implication as implausible.

We conclude that radiation had nothing to do with the fatally delayed autumn migration of many adult Swifts in 1986.

Acknowledgements. Jouni Saario accompanied us during the first part of the study. The Helsinki Swift study group (Olavi Hildén, Kauri Mikkola, Seppo Niiranen, and Heikki Vasamies), let us analyse their Swifts. Ari Karhilahti and Niilo Saarnisuo gave technical help. Tapio Yrjönen and Wallac OY are acknowledged for their generous help in the radioactivity analyses. This report is based on a study funded by the Ministry of Environment.

Selostus: **Tervapääskyt ja Tshernobyl: ei yhteyttä**

Syksyllä 1986 sattuneen tervapääskyjen muuttamattomuuden yhdeksi mahdolliseksi syyksi on Ruotsissa esitetty Tshernobylin onnettomuuden tuottaman säteilyn aiheuttamia häiriöitä lintujen vuosirytmin hormonaalisessa säätelyssä. Tässä tiedonannossa esitetään 138 loka-marraskuussa kuolleen tervapääskyn cesiumanalyysin tulokset. Tervapääskyissä oli vähemmän cesiumia kuin muissa toukokuussa muuttavissa hyönteissyöjälajeissa ja kuitenkin vain tervapääskyn muuttokäyttäytyminen oli poikkeavaa. Säteilyn esittäminen tervapääskyilmiön syyksi sisältäisi myös sen oletuksen, että Ruotsin Länsipohjan ja Uudenmaan syksyiset tervapääskyt — ja vain ne — ovat olleet palavan reaktorin välittömässä tuntumassa sopivalla korkeudella huhti-toukokuun vaihteessa. Tiedossa olevat muiden isotooppien pitoisuudet ilmassa eivät olleet Fennoskandiassa missään vaiheessa niin korkeita, että niillä olisi voinut olla vaikutusta — ja silloinkin vain tervapääskyihin.

References

Elmberg, J. & Stenström, M. 1987: Var de sena tornseglarna radioaktiva? — Vår Fågelvärld 46:192–193.

Hildén, O. 1987: Myöhäisten tervapääskyjen arvoitus. — Eläinmaailma 1987(4):21–23.

Lehikoinen, E., Lindström, J. & Saario, J. 1987: Lintujen radioaktiivisen säteilyn taso Suomessa (Summary: Radioactivity levels in birds in Finland). — Ympäristöministeriö, Ympäristön- ja luonnonsuojeluosasto, Sarja D 33/1987 (in press).

Mikkola, K., Hildén, O. & Niiranen, S. 1987: Sena tornseglare i höstas. — Vår Fågelvärld 46:35.

Authors' address: Laboratory of Zoological Ecology, Department of Biology, University of Turku, SF-20500 Turku, Finland

Received 28 September 1987, accepted 27 October 1987