

mässä. Kun tuntureiden lakialueilla on usein talvella lämpimämpää kuin alhaalla laaksossa, voisi kiirunalla odottaa olevan suhteellisesti pienempi sydän, mutta tunturien lakialueilla huomattava tuulusuus ja se, että kiirunat eivät voi hakeutua lumikieppiin yöpymään/lepäämään, tehnee olot ankarammiksi kuin tunturien rinteillä ja laaksoissa elävillä riekoilla on ympärillään (mm. kiepissä). Tutkitut kaksi pyytä olivat keskimäärin vain n. 30 g kevyempiä kuin kiirunat, mutta niillä oli todella pieni sydän kiirunaan verrattuna. Pyyt viettävätkin talvipäivät hyvin halukkaasti lumikiepeissä, silloin kun eivät ole ruokailemassa. Suomen metsöillä ja teerillä oli suhteellisesti suurempi sydän kuin saksalaisilla yksilöillä (taul. 2).

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## Mid-winter feeding activity of Siberian Tits *Parus cinctus* and a Great Tit *Parus major* at a feeding site north of the Arctic Circle

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The Great Tit *Parus major* and the Siberian Tit *P. cinctus* are diurnal birds which usually awake in the twilight before sunrise and retire to roost at sunset or shortly afterwards (e.g. Franz 1943, 1949, Kluijver 1950, Haftorn 1972). In wintertime they sleep in natural cavities in trees or nest-boxes. In mid-winter in areas north of the Arctic Circle the time available for feeding is a short period around noon. Data on the activity times of tits at and north of 67°N have been published by Franz (1942, 1943, 1949) and Haftorn (1972). On 1—7 January 1980 an opportunity arose to study the feeding activity

of the Great Tit and at least three Siberian Tits at a feeding site in the yard of the Värriö Subarctic Research Station (67° 44' N, 29° 37' E). The nearest inhabited house was 6.6 km away, and no carcasses of ungulates were available in the immediate vicinity of the Research Station.

The light intensity was recorded every quarter of an hour from darkness to darkness, and the air temperature monitored at the Meteorological screen in the yard. The sun was above the horizon at noon, but not visible even under cloudless conditions, owing to the fells to the south of the site. Two chunks of

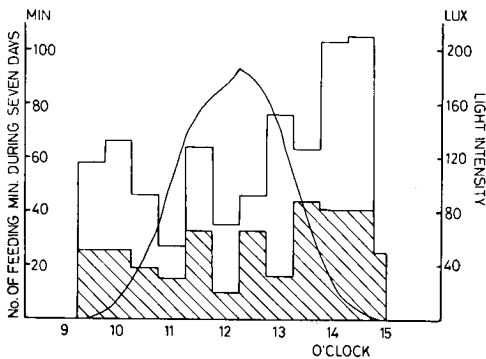


Fig. 1. Mean light intensity (lux; curve) and total number of minutes spent feeding by the Great Tit (shaded columns) and Siberian Tits in half-hour periods on 1—7 January 1980.

pork fat were offered to the tits in front of the window of the Research Station, and artificial light was projected on them under conditions of little or no illumination. The solitary Great Tit seen in the yard was the first individual of this species overwintering in the area in the last 12 winters. Five Siberian Tits, a species overwintering regularly in the area, were seen in the yard at the same time, but only three at the feeding site. The number of tits at the feeding site was recorded every minute. In addition, a Stoat *Mustela erminea* was also seen feeding on the pork in daylight. Even so, a tit might sometimes be feeding on one of the pieces only 40 cm away from the Stoat.

Fig. 1 shows the mean light intensity and the total number of minutes spent in feeding by the tits recorded for every half hour during the seven days. The Great Tit appeared at the feeding site between 09.24 and 10.06, when the light intensity ranged from 1.0 to 28.0 lux, and was seen for the last time in the day between 14.25 and 14.58, at a light intensity of 1.0—10.7 lux. The corresponding times for the Siberian Tit were 09.17—09.42 (0.7—3.7 lux), and 14.30—14.43 (1.7—7.2 lux). At 69° 50' N, Haftorn (1972) never observed tits in nature at light intensities below 14 lux, although captive birds awoke at an intensity well below 1 lux; Willow Tits *P. montanus* appeared at 25 lux and were last seen feeding at about 55 lux. Haftorn (1972) concludes that "as usual in diurnal birds (Thomson 1964, p. 708), the awakening occurred at a lower light intensity than the roosting". Such a difference was not observed in the activity pattern of the present Great Tit, however,

which utilized the potential feeding time very effectively, while the first Siberian Tit appeared at a mean light intensity of 1.7 lux and the last disappeared at a mean intensity of 3.6 lux.

The active period for the Great Tit lasted about  $5.13 \pm \text{SD } 0.23$  hours, and that for the Siberian Tits about  $5.15 \pm \text{SD } 0.22$  hours, which agrees with the findings of Franz (1942, 1943, 1949) at 67° N. At 60° 10' N the day is longer at this time of year, and the activity period of the Great Tit is also longer, 7—8 hrs (Lehtonen 1947).

The present Great Tit was seen feeding 8—11 times per day. The species does not store food (Haftorn 1953) and it is possible that the bird did not feed to any notable extent elsewhere than at the feeding site, whereas the Siberian Tits, which do store food (Haftorn 1953), also fed on other items.

Certain signs of bimodality (Aschoff 1966) were seen in the feeding activity of the tits, with a low peak in the morning, a quiet phase just around noon and a strong peak in the afternoon (Fig. 1). This pattern is similar to that recorded by West (1968) in *Lagopus lagopus* at 64° 52' N in Alaska in mid-winter. If the daytime is divided into three periods of equal length, however, the number of feeding minutes shows only one clear peak, occurring in the afternoon:

Period	No. of feeding minutes	
	<i>P. major</i>	<i>P. cinctus</i>
09.30—11.14	81	185
11.15—12.59	78	163
13.00—14.44	140	329

West (1968) assumes that the strong afternoon peak in *L. lagopus* indicates that the birds are filling their crops for the long night. This explanation apparently also holds for the tits in the present case.

Ulfstrand (1962) reports that food-seeking in tits reaches its peak intensity in mid-winter. The present Great Tit was seen feeding at the site for 11.3—22.6 % of its daily period of activity and 2.4—4.7 % of the whole day. The food was readily available here, however, and no real seeking was necessary. The air temperature in the yard (alt. ca 350 m) on 1—7 January, varied between  $-6.5$  and  $-15.5^\circ \text{C}$ , being as much as  $20.7^\circ$  higher than in the nearby valleys (alt. ca. 270—280 m). This difference is naturally due to temperature inversion. Here on the fell, where the air temperatures are seldom very low, the wind contributes significantly to the severity of the winter (see also Helimäki 1974). The

proportion of the available time employed by this Great Tit in feeding was so low under these conditions that one might expect this southern species to overwinter successfully on food provided by man at lower temperatures and higher latitudes, where its energy consumption would be greater and the winter days shorter. In fact the Great Tit has expanded its distribution markedly in northern Norway (Haftorn 1957); for instance it now overwinters successfully at 69° 50' N (Haftorn 1972).

As regards inter-species relationships, the Siberian Tits clearly dominated the Great Tit at the feeding site, the latter usually flying off immediately on the arrival of one or more Siberian Tits.

*Acknowledgements.* The author wishes to thank the following persons for their technical assistance: Teuvo Hietajarvi, Jouko Iivanainen, Timo Lumme and Reino Taskinen.

This paper constitutes Report No. 104 from the Värriö Subarctic Research Station of the University of Helsinki.

### Selostus: Lapintiaisten ja talitiaisen ruokailuaktiivisuudesta ruokintapaikalla Itä-Lapissa keskitalvella

Tammikuun 1—7 päivinä 1980 rekisteröitiin yhden talitiaisen ja vähintään kolmen eri lapintiaisen ruokailuaktiivisuutta Värriön tutkimusaseman pihalla Itäkairan itäosassa (67° 44' N, 29° 37' E). Lähin asuttu talo on Ainijärven rajavartioasema 6.6 km:n päässä. Lähiympäristössä ei ollut tiedossa haaskoja. Ruokintapaikalla oli tarjolla n. 40 sentin päässä toisistaan kaksi isoa läskikimpaletta.

Aurinko kävi tutkimusaikana keskipäivällä horisontin yläpuolella, mutta ei näkynyt eteläpuolella olevien tunturien vuoksi. Valaistus (luxeina) mitattiin joka neljännestunti. Kuvassa 1 on esitetty käyrällä keskimääräinen valaistus vuorokauden valoisimpana aikana. Talitiainen ilmestyi ruokintapaikalle klo 9.24—10.06 (valaistus 1.0—28.0 luxia) ja hävisi yöpymään klo 14.25—14.58 (valaistus 1.0—10.7 luxia). Lapintiaisen vastaavat arvot olivat 09.17—09.42 (0.7—3.7 luxia) ja 14.30—14.43 (1.7—7.2 luxia). On huomionarvoista, että tiaiset olivat liikkeellä näin alhaisissa valaistuksissa aamu- ja iltapäivisin.

Talitiaisen aktiivisuusaika kesti 5.13 ja lapintiaisen 5.15 t. Talitiainen ei varastoi ruokaa, joten on mahdollista, että se sai ravintonsa lähes yksinomaan ruokintapaikalta, kun taas lapintiaiset, jotka varastoivat ruokaa ja elävät alueella ympäri vuoden, ottivat myös luonnosta ravintoa. Kuvassa 1 esitetään varjostetulla alueella talitiaisen ruokailuun ruo-

kintapaikalla käyttämä aika puolen tunnin jaksoissa 7 vrk:n aikana ja toisilla pylväillä vastaava lapintiaisten aktiivisuus. Aamulla näyttää olevan heikko huippu, keskipäivällä vähäisen ruokailuaktiivisuuden lyhyt jakso ja iltapäivällä selvä huippu. Viimeksi mainittuna aikana tiaiset kerännevät ravintoa kupuunsa pitkää yöpymisjaksoa varten. Talitiainen käytti näissä olosuhteissa (lämpötilan vaihdellessa —6.5 ja —15.5° C välillä) aikaa ruokintapaikalla vain 11.3—22.6 % aktiivisesta ajasta vuorokaudessa, joten sillä näyttää olevan mahdollisuuksia toimeentuloon ankarammissakin sääoloissa ja lyhyemmässä päivässä. Lajit talvehtiikin pohjois-Norjassa (mm. 69° 50' N). Lapintiaiset dominoivat selvästi talitiaiseen nähden ruokintapaikalla.

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