

On the food and feeding habits of the Great Grey Shrike *Lanius excubitor* in Finland

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Introduction

In Finland only one study of the food and feeding habits of the Great Grey Shrike has been published (LEIVO 1942). This deals with winter food and preying methods in great detail. Some remarkable studies of feeding habits during the nesting period in Europe and America have been published (BOHAC 1964, CADE 1967). However, the shrike's food has been studied in Europe mainly during migration period and in overwintering areas (MESTER 1965, HAENSEL & HEUER 1970):

In the summer of 1969 Great Grey Shrikes nested commonly in many places in south and central Finland. The author Grönlund followed closely the nesting of a pair at Alajoki, Lapua, and collected many pellets in the territory; from these authors Itämies and Mikkola identified 251 different kinds of prey. Also, Hannu Hautala and Jorma Luhta made observations of feeding habits during many hours spent photographing the species at the nest. Pellets were also collected in late summer from other parts of Alajoki and 100 preys were identified from these.

The nesting and the biotope

The Great Grey Shrike's nest in Alajoki, Lapua, in 1969 was 2.5 m above the ground in a pine tree; it was situated between the base of a branch and the trunk. The height of the tree was 4 m and it was growing in an area of marsh, 5 m from a grass field. The marsh

had been dyked many years ago and the stand had become luxuriant. In the marsh young pines, some firs, birches and willows formed a 15 m wide dense strip bordering the field; beyond this zone there was a very thick birch/willow scrub approx. 100 × 200 m in area. The lesser vegetation was mainly dwarf birch *Betula nana*, heather *Calluna vulgaris* and wild rosemary *Ledum palustre*.

The nest was found on May 16th, when there were eight eggs, being incubated very intensively by the parent. Next time the nest was visited on May 19th, there were then two nestlings and six eggs in the nest. By May 23rd all the young had hatched. On June 1st all the young were still in the nest, but by June 9th they had left but were present in the immediate neighbourhood.

Feeding habits

The impaling habits of shrikes has been discussed earlier in literature under the separate functions of the use of the spike and the use of the larder (LORENZ & SAINT PAUL 1968, BEVEN & ENGLAND 1969).

According to the observations of Hautala and Luhta, the parents fed the young consecutively over a period of some 15 minutes. They were then away roughly 30–45 minutes before repeating the feeding operation. The Great Grey Shrike hunts for a standard length of time, storing its food at a larder near the nest. When enough food has accumulated there the parents feed the nestlings from it until it is empty, and then resume hunting. The larder was not found, but clearly it was very near the nest, since after feeding the young a parent was

away only some seconds before returning with more food. On the other hand, CADE (1967) found that larders of Northern Great Grey Shrikes in Alaska were not near the nest, but 50—200 yards away.

Insects and lizards were carried whole to the nest, but voles were brought in prepared pieces, often decapitated (the parents eat the heads, cf. MONTAGNA 1939).

Pellets

Pellets of both adults and young were collected beneath the nest and in the territory. About half of the pellets were found near the nest under a dry willow, about a quarter beneath the nest, and the rest from 4—5 places in the vicinity. The pellets were collected on each visit to the nest except on May 16th. On June 1st a careful search for pellets was made up to 200 m from the nest. The furthestmost pellets were found about 100 m away. The last pellets were collected on June 9th after the young had flown.

Of the pellets 61 were whole. The length and height were measured and the width always measured at the broadest point:

Average size	$2.7 \times 1.2 \times 1.0$ cm (n=61)
Largest	$4.8 \times 1.4 \times 0.9$
Smallest	$1.1 \times 1.0 \times 0.8$

There were on average the remains of 2.1 insects per pellet. In one pellet there was a maximum of ten insect remains, whilst in ten pellets there were none at all. There were on average 2 vertebrate kinds of prey per pellet (max. 5 and min. 1).

The identification of the vertebrates presented no problem as their bones were for the most part whole; the number of prey was calculated from the bones of limbs, since they were more numerous than, for example, skulls. The identification of insects was often very difficult, because their remains, naturally, were small and fragmented. Different methods were used for different insect groups: the numbers of wasps and bumble bees were calculated from the number of first somites of the abdomen. Their shape is different from the others and so it was relatively easy to pick them out. The number of ants was counted by heads, and the identification of species of beetle and their numbers was established from forewings (elytra). The taking of these hard insects

indicates a highly developed digestive system; MOUNTFORT (1958) records a parent of the southern race *L. e. meridionalis* feeding a 5 inch lizard to a 3 inch chick, and feeding it again less than 20 minutes later. The surprising thing about its food was the enormous quantity consumed: a shrike in captivity, whose weight was 53.4 grams, ate an average totalling 30 grams per day (MONTAGNA 1939).

Food during the nesting period

Our results are based on the analysis of the 61 whole pellets and of numerous broken ones. The composition of food taken was as follows:

	%
<i>Sorex minutus</i>	1.2
<i>Sorex araneus</i>	4.8
Shrews, total	6.0
<i>Microtus arvalis</i>	2.0
<i>Microtus agrestis</i>	1.2
<i>Clethrionomys vel Microtus</i>	2.4
<i>Clethrionomys glareolus</i>	4.8
Voles, total	10.4
<i>Micromys minutus</i>	1.2
<i>Lepus timidus</i> , young	0.4
Mammals, total	18.0
<i>Anthus</i> size small bird	1.2
<i>Phylloscopus</i> size	1.6
Middle size young bird	0.4
Birds, total	3.2
<i>Lacerta vivipara</i>	26.7
Insecta coll.	52.2
(Total No. of prey animals 251)	

The favourite vertebrate prey is the lizard *Lacerta vivipara* (26.7 %). The Alajoki shrike also took the young of a hare, which Jorma Luhta had found dead and which he left near the nest. The parents fed the hare to their nestlings between June 1st and 9th. This shows that Great Grey Shrikes may also eat carrion (see also KIVIRIKKO 1947). In terms of weight of prey, voles and shrews form a higher proportion than the outnumbering insects; relative nutritional value is indeterminable.

Numerically the main food during the breeding period was made up of insects (52.2 %). The composition of the insect food was as follows:

	%
Formicidae	6.1
Vespidae	
<i>Paravespula rufa</i>	34.4
<i>P. vulgaris</i>	6.1
<i>Dolichovespula norvegica</i>	6.1
Bombidae	13.0
Hymenoptera, total	65.7
Carabidae	
<i>Carabus granulatus</i>	7.6
<i>C. nitens</i>	0.8
<i>Pterostichus</i> sp.	4.6
Unidentified sp.	3.8
Dytiscidae	
<i>Colymbetes</i> sp.	0.8
Silphidae	
<i>Blitophaca opaca</i>	2.3
Elateridae	
<i>Corymbites</i> sp.	2.3
Unidentified sp.	4.6
Lamellicornia	
<i>Geotrupes stercorarius</i>	0.8
<i>Cetonia aurata</i>	2.3
Chrysomelidae	
<i>Phyllotreta</i> sp.	0.8
Unidentified sp.	0.8
Cerambycidae	
<i>Rhagium mordax</i>	0.8
Curculionidae	
<i>Otiorrhynchus dubius</i>	0.8
Coleoptera, total	32.8
Lepidoptera	0.8
Diptera	0.8

(Total No. of prey animals 131)

This incidence of insects is rather higher than would be expected in a year when voles were abundant in the district (cf. GRÖNLUND & MIKKOLA 1969). Further, since the insects taken are all rather chitinous, their food value is relatively low; but from these shrikes get, for example, sugar, albeit in small quantity, and this may be significant.

The large number of wasps taken may partly be explained by the presence of a wasp-nest in the area, providing a constant supply of food. RAITASUO (1963) claims that shrikes learn from bitter experience to avoid armed wasps and bumble bees and to recognize their black and yellow warning signals. However, it has been noted that Red-backed Shrikes *Lanius collurio* also eat many

wasps and bumble-bees in summer (CAJANDER 1929). The number of large carabids may have been due to the nearby cultivation area. Caterpillars also may have been taken, but what remains of these cannot be determined. There were remains of beetles in 24 of the 61 pellets, of wasps in 23, and of bumble-bees in 22. Lizard remains were found in 36 pellets of the 61 and those of voles in 47 and shrews in 13.

Autumn food

The author Grönlund also studied the post-breeding activity of the Great Grey Shrike in Alajoki, Lapua. In July and August the birds moved about in small groups of two or three individuals. After the middle of August the shrikes dispersed and hunted singly in very small feeding territories. Great Grey Shrikes often maintain territories in their winter quarters (MESTER 1965).

Accumulations of pellets under regular perches were collected from some feeding territories. The species taken are listed as follows:

	%
<i>Microtus arvalis</i>	3
<i>Micromys minutus</i>	1
<i>Sorex araneus</i>	1
<i>Phylloscopus</i> size small bird	1
Vertebrata, total	6
Vespidae	
<i>Paravespula rufa</i>	19
Bombidae	41
Sphecidae	
<i>Odynerus</i> sp.	1
Formicidae	10
Carabidae	
<i>Carabus granulatus</i>	1
<i>C. nitens</i>	2
Unidentified sp.	16
Silphidae	
<i>Necrophorus</i> sp.	1
Cerambycidae	1
Lamellicornia	
<i>Geotrupes stercorarius</i>	1
Orthoptera	1
Evertebrata, total	94

(Total No. of prey animals 100)

The proportion of insects eaten had risen remarkably to 94 %. The autumn pellet content confirms that the Great Grey Shrike does not avoid wasps and bumble-bees, as there was a continuously high percentage of them in samples collected in different parts of the area. In summer more wasps than bumble-bees were taken, but this was reversed in autumn.

The only change in the composition of the vertebrate prey was the complete absence of lizards in the autumn period. Since lizards remain active at this time, as do small mammals, this selection by the shrikes of insect food may correspond to a bio-chemical need for certain substances that the body can store over winter. Sugar has already been cited as one possibility.

Winter food

Our knowledge of the shrikes' winter food is derived from observations and from finds of larders during the winters of 1936/37, 1937/38 and 1938/39 (LEIVO 1942) and 10th—22nd February 1948 (Siivonen, unpublished material) in Helsinki. The winter food of the Great Grey Shrike was as follows:

	%
<i>Microtus agrestis</i>	54
<i>Micromys minutus</i>	8
<i>Mus musculus</i>	1
<i>Sorex araneus</i>	11
<i>S. minutus</i>	1
<i>Neomys fodiens</i>	1
Mammals, total	76
<i>Carduelis spinus</i>	1
<i>C. flammea</i>	5
<i>Parus major</i>	8
<i>P. caeruleus</i>	4
<i>Pyrrhula pyrrhula</i>	6
Birds, total	24

(Total No. of prey animals 85)

Small mammals and birds form the whole diet. The percentages of birds

taken averages 23.5, that of small mammals 76.5 %. According to LEIVO (1942), Great Grey Shrikes eat more small mammals than birds during periods of no or little snow. During the period when snow cover is very thick this species eats correspondingly more birds, since small mammals are less accessible.

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Summary

The food and feeding habits of the Great Grey Shrike during the breeding season was studied at one nest with eight young at Alajoki, Lapua, in 1969. During the breeding season both parents fed their young. The prey was always stored first near the nest during a period of 30—45 minutes' hunting; the parents would then feed their young for about 15 minutes, until the store was empty and they had to resume hunting.

The composition of the food was studied from pellets found near the nest. During the breeding season, 52 % of prey animals consisted of insects, including many wasps and bumble-bees. Lizards formed almost 27 % of the prey. Although the percentage of insects taken is three times higher, in terms of weight the most important prey is made up of voles and shrews.

In the autumn food the proportion of insects was 94 %. No remains of lizards were found. In winter insects are not available and Great Grey Shrikes eat small mammals and birds. Thus, the most interesting finding of this study is the steady supersession of vertebrate by invertebrate prey from the beginning of the year to the autumn.

Selostus: **Lapinharakan** *Lanius excubitor* ravinnosta ja ruokailutavoista Suomessa.

Lapinharakan pesintäaikaista ravintoa ja ruokailutapoja on tutkittu yhdellä pesällä 1969 Lapuan Alajoella. Pesässä oli kahdeksan munaa, joista kaikista kehittyi lentokykyinen poikanen. Pesintäaikana molemmat emot ruokkivat poikasiaan. Ensin lapinharakat varastoivat 30—45 min. ajan ravintoa pesän läheisyyteen, minkä jälkeen varasto syötettiin yhtäjaksoisesti n. 15 min. aikana poikasille. Varaston loputtua toistui sama varastointi uudestaan.

Ravinnon koostumusta tutkittiin pesän läheltä löytyneistä oksennuspalloista. Pesintäaikaisesta ravinnosta oli lukumääräisesti 52 % hyönteisiä, näistä pääosa ampiaisia ja kimalaisia. Sisiliskoja oli ravinnosta melkein 27 %. Jos saaliiden painot huomioitaisiin, syötyjen myyrien ja päästäisten osuus olisi suurempi kuin hyönteisten.

Lapinharakan syysravintoa tutkittiin muutamilta syysreviireiltä Lapuan Alajoelta 1969 kerätyistä oksennuspalloista. Sisiliskot puuttuivat kokonaan heinä—elokuun ravinnosta ja hyönteisten osuus oli peräti 94 %.

Lajin talviravintoa on tarkasteltu lyhyesti Helsingissä tehtyjen, osaksi jo julkaistujen havaintojen perusteella. Talvella sisiliskoja ja hyönteisiä ei ole tarjolla ja lapinharakka syö vain lintuja ja pikkunisäkkäitä.

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