

Body fat reserves and liver glycogen of the Waxwing *Bombycilla garrulus* overwintering in northern Finland

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The Waxwing *Bombycilla garrulus* is one of the few frugivorous birds of the temperate and boreal zones of the Northern Hemisphere (Morse 1975). This species is characterized by a relatively short intestine, low relative plumage weight, pointed wing-tip, high proportion of hand wing within the total wing area and especially large liver (Pulliainen et al. 1981). Rowan-berries (*Sorbus aucuparia*) constitute the main fruit on which the Waxwing overwinters in snowy conditions (Pulliainen 1978). These berries pass through the digestive tract in approximately half an hour (Borowski 1966), the surface structure of the seeds remaining unaltered (Pulliainen & Erkinaro 1978). This feeding and digestion pattern presupposes an almost continuous passage of berries through the digestive tract during the active period, and possible storage of fat and/or glycogen in the body. The latter was studied at the University of Oulu, northern Finland, in winter 1984.

The number of Waxwings started to increase at the beginning of the year in Oulu (Ojanen & Lähdesmäki 1984). Fig. 1 shows the numbers of Waxwings recorded in the city in January-March (Ojanen & Lähdesmäki 1984), and the time when 12 birds were killed by flying against windows in the campus of the university. These birds were immediately picked up, and aged according to Svensson (1976). Glycogen was determined from their fresh livers according to the method of Siu et al. (1970). From the rest of the bodies the feathers, tarsi, feet and digestive tracts were removed. The carcasses were then ground, homogenized and extracted with ethanol in order to determine the soluble fat content.

The contents of glycogen in the liver and fat in the body were as follows:

Group	Glycogen (mg/g fr.wt.)		Fat (% dr.wt.)		N
	Mean±SD	Range	Mean±SD	Range	
Juveniles	2.0±4.8	0.1-13.9	41.4±9.4	30.0-55.8	4
Adults	0.2±0.02	0.1-0.2	39.1±1.3	29.0-55.1	8

These data provide strong evidence that the Waxwings overwintering in the north store energy mainly in the form of fat. This had already been suggested by preliminary studies, in which the fat content (only the contents of the digestive tract excluded) varied within the range 0.5-35.0 % (Pulliainen et al. 1981). The present birds were in excellent condition, although they had lived at very low ambient temperatures and although they were very often seen flying in large restless flocks. In addition to serving as an energy reserve, which is really needed for flying from one rowan-tree or wood to another, a fat reserve of this size may also have an insulative function in this kind of conditions.

The glycogen percentages recorded here were surprisingly low, especially when account is taken of the rapid metabolism in these birds. The glycogen content of the liver of the Willow Grouse *Lagopus lagopus*, fed on berries (approx. 60 %) averaged 8.3 mg/g in September-October and about 2 mg/g in winter (Pulliainen & Tunkkari 1984). In only one Waxwing did the glycogen content exceed 10 mg/g (13.9). In other connections values of 8.2, 8.3 and 8.6 have been recorded (unpubl. data), but in the majority of the samples studied the values have been below 0.5.

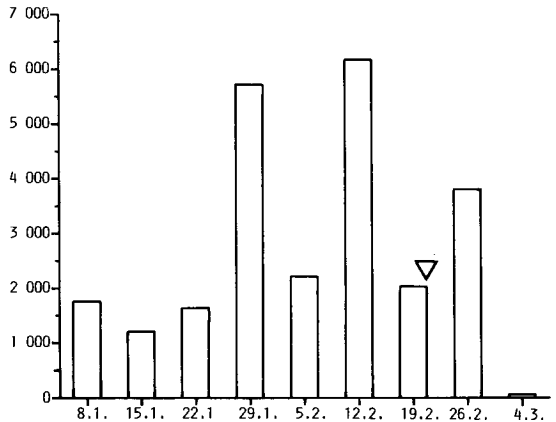


Fig. 1. The numbers of Waxwings recorded in Oulu on 8 January - 4 March (according to Ojanen & Lähdesmäki 1984). The triangle shows the time when present samples were taken.

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Selostus: Pohjois-Suomessa talvehtivien tilhien ruumiin rasva- ja maksan glykogeenivarastot

Tammi-helmikuussa 1984 Oulun kaupungissa liikkui suuria tilhiparvia (kuva 1), joita koskevat tiedot keräsivät Ojanen & Lähdesmäki (1984). Oulun yliopiston Linnanmaan yliopistoalueella 12 tilheä kuoli lennettyään ikkunoihin. Ne poimittiin talteen välittömästi, niiden ikäluokka määriteltiin (Svensson 1976) sekä niiden maksan glykogeeni- ja ruumiin rasvapitoisuudet (höyhenet, sulat, nilkat ja varpaat poistettuina) määriteltiin.

Tilhet olivat varastoineet energiaa nimenomaan rasvan muodossa. Sen osuus ruumiin kuivapainosta vaihteli 29 ja 56 prosentin välillä. Näin suurella rasvamäärällä on merkitystä energiavaraston ohella myös lämmönhukkaa rajoittavana tekijänä. Sen sijaan maksan glykogeenipitoisuudet osoittautuvat yllättävän alhaisiksi; vain yhdessä tapauksessa glykogeenia oli yli 10 mg/g tuorepainoa. Suurimmassa osassa näytteitä pitoisuus jäi alle 0.5 mg/g.

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FIRST ANNOUNCEMENT

The Third Italian Conference of Ornithology will be held in Salice Terme, Pavia, Northern Italy, from 3 to 6 October 1985 organized by the University of Pavia, Dipartimento di Biologia Animale, by the Centro Italiano Studi Ornitologici and by Regione Lombardia, Assessorato Foreste, Caccia e Pesca.

The Third Italian Conference of Ornithology welcomes the most wide participation and will organize discussions concerning topics of specific scientific interest, including also – but not limited to – the avifauna of the Mediterranean Area. The scientific programme will consist of the following events:

Posters will deal with free topics, not limited in number. They will be grouped in sessions; discussions about them will be planned.

Symposia: 3 plenary sessions with introductory reports and communications relative to a selected subject. Three symposia have been planned.

Among possible subjects: Biology and management of *Galliformes*; Strategies and criteria for avifaunal conservation.

Round table discussions: 4 round table discussions have been planned. They will deal with more specific topics, such as: Bird ringing for study purposes; Control of bird population in towns; etc.

Working groups: meetings of restricted groups upon invitation, e.g.: Committee for accidental species; Editing Committees of Ornithological periodicals. Two or more three more working groups upon request have been planned.

Suggestion and request of informations are particularly welcome; they should be directed to the Conference Secretary as soon as possible in order to define the final programme of the Conference.

The Second Announcement (March 1985) will indicate the final programme and will provide official forms for registration and presentation of scientific contribution.

ADDRESS OF THE CONFERENCE SECRETARY: Segreteria III Convegno Italiano Ornitologia, Dipartimento Biologia Animale
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