

Suomen sisämaan kannoista ei ole olemassa vastaavia selvityksiä käsisulkienväristä. Siten ei ole (nykyisin) aineistopohjaisia perusteita pitää Itämeren aluetta myöskään ns. *cachinnans*-muodon esiintymisalueena (yhtä vähän kuin *omissus*-muotoa *L. cachinnans*-lajin alalajina, vrt. Glutz & Bauer 1982). Todennäköisesti Itämeren mereiset kannat ovat nykyään nimirodun ja läntisen *argenteus*-rodun välittävää muotoa, jonka jalat ovat useimmiten harmahtavan lihanväriset, silmäreunus oranssi tai kellanoranssi ja jonka käsisulissa on runsaasti mustaa.

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Seasonal changes in the mineral content of the liver of the Willow Grouse (*Lagopus lagopus*) in the far north of Finland¹

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Seasonal changes have been recorded in the fresh weight and glycogen content of the liver and in many other characteristics of the Willow Grouse (*Lagopus lagopus* L.) in the far north of Finland (Pulliainen & Tunkkari 1983, 1984, Pulliainen 1985). The diet of the species is also known to vary from season to season (Pulliainen & Iivanainen 1981, Pulliainen, unpubl. data), but until now no information was available on the mineral content of the liver. During one year 53 Willow Grouse were shot in the districts of Inari, Salla and Savukoski in North Finland. They were refrigerated as soon as possible and sent to Oulu, where the livers were removed and dried at 70°C for two days. The manganese, phosphorus, magnesium, calcium, zinc and copper contents were determined with direct-current plasma emission spectrometry (DCP-AES; for methods, see Pulliainen & Lajunen 1984).

Since sex-related differences occurred in the case of only one element, the two sexes are dealt with together here. This exceptional case concerned the concentration of calcium in April–May, i.e. during the breeding season, the average value being significantly lower in the females than in the males ($t=3.13$, $p<0.05$, $df=10$). The daily consumption of calcium by females is great (2 g) during the egg-laying period. The ingestion, absorption and turnover of calcium must be very high in order supply the calcium required for shell formation. Although absorption is known to be higher

when calcium is being deposited in the shell than at other times (Hurwitz & Bar 1965), the large requirement for shell formation seems to lower the calcium level in the liver to some extent (see also Fig. 1).

The concentration of phosphorus was about 25-fold that of calcium (Fig. 1). It shows the same rhythm as calcium, the minimum level occurring in the spring (Fig. 1). In general phosphorus is utilized less efficiently and in a more variable manner than calcium (Loosli 1973), which may be reflected in its concentration in the liver.

The level of magnesium was a little higher than that of calcium, and it showed no significant seasonal variation (Fig. 1). Protein supplements are said to decrease magnesium availability (Loosli 1973). The diet of Willow Grouse, however, is rather poor in protein throughout the year (Pulliainen, unpubl. data).

Manganese, copper and zinc are essential trace elements and all showed significant seasonal variation in the liver (Figs. 1–2). Copper is essential for haemoglobin formation, manganese for normal bone formation and prevention of perosis, and zinc, among other things, for prevention of parakeratosis (Fritz 1982). The variations recorded may reflect fluctuations in the availability or in the rate of consumption. The peak recorded for manganese in September–October is interesting, since it is most probably connected with the consumption of large amounts of blueberries. The manganese values of three Willow Grouse which had abundant blueberries in their crops were: 101 (ad. male), 148 (ad. female) and 301 (juv. female) µg/g.

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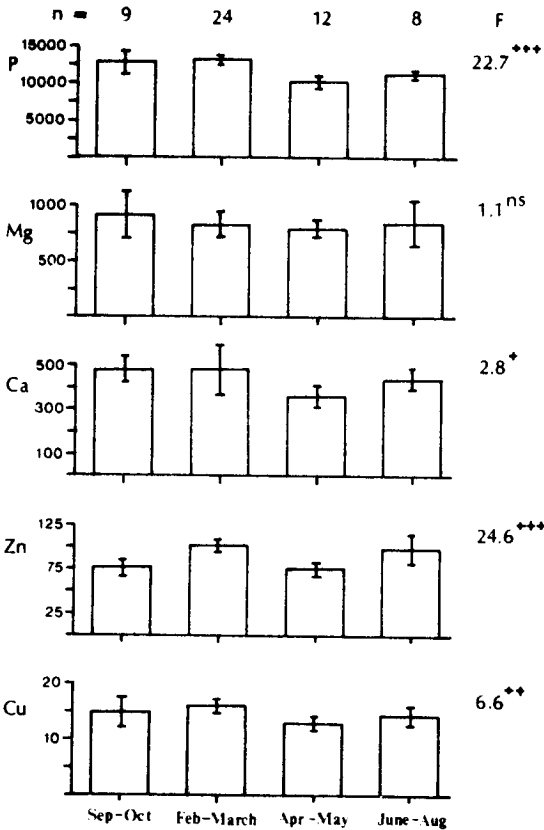


Fig. 1. Seasonal changes in the proportion (mg/kg, $\bar{X} \pm S.D.$) of phosphorus, magnesium, calcium, zinc and copper in the liver of the Willow Grouse killed in the far north of Finland.

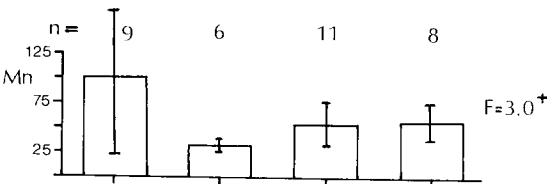


Fig. 2. Seasonal changes in the proportion (mg/kg, $\bar{X} \pm S.D.$) of manganese in the liver of the Willow Grouse killed in the far north of Finland (the periods are the same with the Figure 1.).

Selostus: Riekon maksan mineraalipitoisuuksista pohjoisimmassa Suomessa

Vuoden eri aikoina pohjoisimmassa Suomessa tapettujen riekkojen maksoista (per kuiva-aine) määritettiin fosfori-, magnesium-, kalkki-, mangaani-, sinkki ja kuparipitoisuuksia kaariplasmaemissiospektrometrilla. Magnesiumpitoisuuksia lukuunottamatta muissa mineraalipitoisuuksissa todettiin vuodenaikaisvaihtelua (kuvat 1–2).

Yhtä poikkeusta lukuunottamatta sukupuolten välillä ei todettu eroja. Tämä poikkeuksellinen tapaus koski kalkkipitoisuutta huhti-toukokuussa, jolloin lisääntymistoiminnot käynnistyvät. Naarasriekkojen maksoissa on silloin vähemmän kalkkia kuin koiraiden maksoissa. Munaa kohti (muninta toukokuun lopussa – kesäkuun alussa) naaras joutunee käyttämään parisen grammaa kalkkia. Yleensä lintu tehostaa kalkin absorptiota, kun käyttö lisääntyy.

Kalkin kanssa samaa rytmisyyttä havaittiin myös fosforilla, jonka pitoisuudet olivat noin 25 kertaa korkeammat kuin kalkilla. Mangaanin korkea pitoisuus syys-lokakuussa herättää erityistä mielenkiintoa, sillä se lienee yhteydessä runsaaseen mustikoiden syöntiin tuohon vuodenaikaan. Maksan mineraalipitoisuuksissa heijastunevat toisaalta saatavuus ja toisaalta tarve ja kulutus.

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