

Observations on the nesting of birds in the snow¹

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Two observations of birds nesting in snow are reported. In northern Finland a Capercaillie, *Tetrao urogallus*, and in western Finland an Eagle Owl, *Bubo bubo*, laid their eggs in the snow. All nine eggs laid by the Capercaillie hatched. The melting of the snow destroyed the Eagle Owl's nest. In addition, during the late spring of 1968 in northernmost Finland a Bean Goose, *Anser fabalis*, was observed to lay its eggs on frozen ground in a small snowless place on the summit of a large hill, the surroundings of which were covered by a thick layer of hard snow.

The acceptance of snow as a nesting site is assumed to be either an expression of the plasticity of the nest site selection mechanism or a consequence of the scarcity of snowless places suitable for nesting at the moment when the internal motivation of site selection and egg-laying is at its maximum.

The hatching of the eggs laid by the Capercaillie in the snow is further evidence for the assumption that the incubation period (and the preceding egg-laying period) is not the most critical period in the life cycle of this species.

Introduction

Especially in arctic and subarctic conditions ground-nesting birds often begin building nests and laying eggs when the ground is still partly covered by snow. The acceptance or avoidance of snowy places as a nesting site in these conditions present an interesting ecological problem. The purpose of the present paper is to describe two cases when a bird laid its eggs in the snow and one case when a bird laid its eggs in the only snowless part of a vast snowy area.

Case reports

Case 1. On May 17, 1968, a nest (three eggs) of a Bean Goose, *Anser fabalis*, was found at Pokka, south of the river Repojoki, in the commune of Inari, Finnish Lapland (68°26'N, 25°43'E). A female Bean Goose flew from the nest; the eggs were rather warm.

The nest was located in a small (less than one sq.m.) snowless area on the summit of a

large hill, at the base of a large pine. The surrounding terrain was covered by a thick layer of hard snow. The ground was still frozen in the snowless area and therefore the bird had not been able to form any nest depression. The eggs lay side by side on the ground. — The later history of the nest is not known.

It is worth mentioning that still on May 24, 1968, the hills at Pokka and about two thirds of the surrounding forested lowlands were covered by hard snow and the rivers of the area covered by hard ice.

Local observer: Aarne Ylitalo.

Case 2. In the middle of April, 1970, an Eagle Owl, *Bubo bubo*, laid an egg in the snow at Flada in the commune of Mustasaari, western Finland (63°05'N, 21°48'E) in a mixed forest of c. 12 sq.km. The depth of snow was 35 cm. There were some feathers in the nest.

The snow melted away in a few days and the egg sank on to a stump which could not form any base for the nest. A new nest was built at the distance of about 100 m from the first one on snowless ground at the base of a big boulder and two eggs were laid, both of which hatched.

Local observer: Eero Murtojärvi.

Case 3. On June 19, 1971, a Capercaillie, *Tetrao urogallus*, laid an egg in the snow under the crown of a fallen pine at Lehtiniemi in the commune of Posio, northern Finland (66°15'N, 28°E). Nine eggs were laid in all. At the beginning of laying the average depth

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of snow in this area was about 50 cm, but there were also some snowless places around the bases of trees. By the time the last egg was laid, the snow had melted.

The first four eggs sank partly into the snow. After the fourth egg had been laid moss was put under the eggs. All nine eggs hatched.

The nest was located in a felling area (about one hectare), at a distance of about 20 m. from the edge of a forest, about 5 m. from the nearest road, about 200 m. from the nearest bog and about 300 m. from the nearest lake.

Local observers: Heino Lehtiniemi and Matti Tikkanen.

Discussion

In general, ground-nesting birds select snowless places as their nesting sites. Especially in early spring, however, suitable snowless places for nesting may be scarce. In this situation these birds usually either gather to the snowless places available (e.g. Capercaillie in the neighbourhood of the Värriö Subarctic Research Station, northeastern Lapland, in late spring 1968, and the Bean Goose in case 1) or migrate to the south (e.g. Bean Geese over Karigasniemi, northernmost Lapland, and the surroundings of the Meltaus Game Research Station, western Lapland, on 11–30 May 1968). On the basis of present knowledge, the laying of eggs in the snow may be regarded as an exceptional behaviour pattern of these birds.

The present observations show that at least the Capercaillie and the Eagle Owl may lay their eggs in the snow. As far as we know, the present cases are, however, the first ones known. The laying of eggs in the snow was also recorded in conditions (the case 3) where there were also snowless places available in the neighbourhood of the "snow" nest. Thus it may be thought that the acceptance of the snow as a nesting site is either an expression of the plasticity of the nest site selection mechanism (cf. the review by HILDÉN 1965) or a consequence of the scarcity of snowless places suitable for nesting at the moment

when the internal motivation to select a nest site and to lay eggs is at its maximum.

The tolerance to exposure to low temperatures has especially been studied with chicken eggs (e.g. JULL et al. 1948, MORENG & BRYANT 1954, 1955). JULL et al. (1948) reported that in one series of experiments at -23° to -25°C the temperature dropped to -29°C on one occasion, resulting in a relatively high percentage of cracked eggs though no less than 25 % of the fertile eggs incubated hatched. MORENG & BRYANT (1954) found a high degree of resistance among first-day embryos, when exposed to -23°C for periods ranging from 70 to 90 minutes. When an internal egg temperature of approximately 0°C was maintained, a limited number of one-day-old embryos withstood exposure up to 76 hours (MORENG & BRYANT 1955). GREENWOOD (1969) has reported a case when a Mallard egg hatched although it cracked by freezing. Against this background it is not surprising that (in case 3) all Capercaillie eggs laid in the snow hatched. The female Capercaillie has elsewhere been observed to leave the nest when the temperature was below freezing point, but the embryos remained unaffected (SEMENOV-TJANŠANSKIJ 1960;¹ cf. also LENNERSTEDT 1966, PULLIAINEN 1971). The present case (3) is further evidence for the assumption presented by PULLIAINEN (1971) that the incubation period (and the preceding egg-laying period) is not the most critical period in the life cycle of the Capercaillie.

¹ We have a further observation of the same phenomenon. On May 16, 1968, a nest with two eggs of a Capercaillie was found at Ruokojärvi, Pielisjärvi, eastern Finland. On each of the days May 18–22 the female laid an egg in the nest. The lowest temperature recorded during this period was -8°C . The female began incubating the eggs on May 23. On June 18, six chicks hatched out of the seven eggs. Local observer: A. Rikkonen.

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Selostus: Havaintoja lintujen pesimisestä lumihangessa.

Lintujen pesimisestä lumihangessa on saatu tietoon kaksi havaintoa. Pohjois-Suomessa koppelo ja Länsi-Suomessa huuhkaja munivat munansa lumihangessa olevaan pesäkuoppaan. Kustakin koppelon munimasta yhdeksästä munasta kuoriutui poikanen. Huuhkajan pesä tuhoutui lumen sulaessa. Lisäksi kuvataan tapaus, jolloin pohjoisimmassa Suomessa myöhäisenä keväänä 1968 metsähanhi muni munansa laajan lumipeitteisen vaara-alueen ainoaan pienialaiseen pälveen, jonka alla oleva maapohja oli jäässä.

Lumihangen hyväksymisen pesimisalustaksi katsotaan olevan joko ilmaus pesäpaikan valintamekanismin joustavuudesta tai seuraus pesimiseen sopivien lumettomien paikkojen niukkuudesta hetkellä, jolloin sisäinen motivaatio pesäpaikan valintaan (ja munimiseen) on suurimmillaan.

Poikasten kuoriutumisen lumihankeen muni-
tuista metson munista katsotaan olevan lisä-
näyttö PULLIAISEN (1971) esittämälle väit-

tämälle, että haudonta-aika (ja sitä edeltävä munimisaika) tuskin on kriittisin kausi metson vuotuisessa elämänkierrossa.

References

- GREENWOOD, R. J. 1969. Mallard hatching from an egg cracked by freezing. — *Auk* 86:752—754.
- HILDÉN, O. 1965. Habitat selection in birds. A review. — *Ann. Zool. Fennici* 2:53—75.
- JULL, M. A., McCARTNEY, M. G. & EL-IBIARY, H. M. 1948. Hatchability of chicken and turkey eggs held in freezing temperatures. — *Poultry Sci.* 27:136—140.
- LENNERSTEDT, I. 1966. Egg temperature and incubation rhythm of a Capercaillie (*Tetrao urogallus* L.) in Swedish Lapland. — *Oikos* 17:169—174.
- MORENG, R. E. & BRYANT, R. L. 1954. Effects of subfreezing temperature-exposure on the chicken embryo. I. Survival and subsequent growth up to the time of hatch. — *Poultry Sci.* 33:855—863.
- 1955. The tolerance of the chicken embryo to periods of low temperature exposure. — *Poultry Sci.* 34:1342—1348.
- PULLIAINEN, E. 1971. Behaviour of a nesting Capercaillie (*Tetrao urogallus*) in north-eastern Lapland. — *Ann. Zool. Fennici* 8: 456—462.
- SEMENOV-TJAN-SANSKIJ, O. (СЕМЕНОВ-ТЯЕ-ШАНСКИЙ, О.) 1960. Экология тетеревиных птиц. *Trudy Laplandskogo Gosudarstvennogo Zapovednika* 5:1—318.

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