

WILLOW PTARMIGAN CHICKS CONSUME MOSS SPOROPHYTE CAPSULES

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Abstract.—Willow Ptarmigan (*Lagopus lagopus*) chicks consumed sporophyte capsules of a moss, *Distichium inclinatum*, at La Pérouse Bay, near Churchill, Manitoba, Canada. Six chicks (6–16 d old) were examined over 3 yr, and crops of all chicks contained moss capsules. In two chicks, capsules represented a substantial proportion of the total crop contents. Crops contained little animal matter. Moss sporophyte capsules may provide an easily accessible forage for rapidly growing grouse chicks of northern populations.

POLLUELOS DE *LAGOPUS LAGOPUS* CONSUMEN CÁPSULAS DE ESPOROFITOS DE MUSGOS

Sinopsis.—En un estudio realizado en Bahía La Pérouse, cerca de Churchill, Manitoba, Canada, se encontró que polluelos de *Lagopus lagopus* utilizaron como alimento cápsulas de esporofitos del musgo *Distichium inclinatum*. Los buches de seis polluelos (6–16 d) contenían cápsulas del musgo. En dos polluelos las cápsulas representaron una proporción sustancial del contenido total del buche. Los buches examinados contenían muy poco material animal. Las cápsulas de esporofitos muy bien podrían proveer de un alimento de alta calidad y de fácil acceso a polluelos de lagópodos de las poblaciones del norte.

Young galliform chicks typically consume large quantities of invertebrates to meet growth and energetic demands (Ford et al. 1938, Jorgensen and Schytte Blix 1985, Spidsø 1980, Wise 1981–1982). Young ptarmigan (*Lagopus* spp.) chicks consume large amounts of plant material, however with a few highly preferred species dominating the diet (Choate 1963; Dixon 1927; Gardarsson and Moss 1970; Pullianen and Eskonen 1982; Savory 1977; Spidsø 1980; Weeden 1959, 1963, 1969; Williams et al. 1980). We report crops of Willow Ptarmigan (*Lagopus lagopus albus*) (Gmelin) chicks containing moss sporophyte capsules of *Distichium inclinatum*, and comment on the potential dietary importance of moss capsules to young ptarmigan chicks in northern Canada.

METHODS

Willow Ptarmigan chicks were collected opportunistically at La Pérouse Bay, Manitoba, Canada (58°24'N, 94°24'W) July 1981–1984. The Mast River estuary at this subarctic tundra site was frequented by willow ptarmigan during nesting (June) and brood rearing (July) (Martin 1984). *Carex aquatilis*, *Potentilla egedii* and *Hipperus tetraphylla* dominated shore-

line vegetation. *Salix brachycarpa* and *Myrica gale* dominated frost heave mounds and larger islands. Mosses (mainly *Distichium inclinatum* and *Campylium stellatum*) were common on the tops of these islands (Jefferies et al. 1979, Scott 1990).

We collected a total of six chicks freshly killed. We determined age of chicks (6–16 d) directly as we marked chicks with patagial wing tags on the day of hatch (Hannon et al. 1990). We stored the contents of five crops and one gizzard in 10% ethyl alcohol or 10% formalin and identified, counted (if possible), dried at 60 C for 48 h and weighed capsules and plant fragments from each sample. We weighed total invertebrate material in crops, but did not identify species.

RESULTS AND DISCUSSION

All crop and gizzard contents examined included *D. inclinatum* and, in two of six cases, capsules made up a substantial proportion (84 and 9%, respectively) of the dry mass ingested (Table 1). Chicks had consumed moss capsules through the month of July and in each of the 3 yr for which samples were available. The length of moss capsules was 2–3 mm.

Diversity of food types identified in individual samples was low (*Distichium* capsules, willow leaf fragments, berries of *Arctostaphylos rubra* and trace amounts of invertebrate material). Samples from four chicks 13–16 d old contained greater quantities of willow leaves and seeds or berries of *A. rubra* than younger chicks. The maximum length of plant fragments increased from <5 mm in 9-d-old chicks to 12 mm in 14-d-old chicks. The three chicks collected in the afternoon or evening had greater amounts of forage (dry mass) in their crops (mean = 236.0 mg \pm 65.7 SE, $n = 3$) than the three chicks collected in mid to late morning (mean = 14.3 \pm 11.9 mg, $n = 3$). Watson (1964) reported a similar finding for Rock Ptarmigan (*L. mutus*).

Whereas several studies reported that invertebrate prey comprised 38–100% of the crop contents of young ptarmigan chicks (Dixon 1927, Gardarsson and Moss 1970, Pullianen and Eskonen 1982, Savory 1977, Spidsø 1980, Weeden 1959), we found a predominance of plant material and a surprising lack of invertebrate material in crops of young chicks (Table 1), despite no apparent lack of invertebrates in the area (Mallory 1987, Martin and Hik, unpubl. data). Ptarmigan chicks may forage on moss capsules because they are more easily encountered and taken than invertebrate prey and represent an alternative source of protein, even at times when invertebrates are relatively abundant. Dixon (1927) recounted the difficulty a young ptarmigan chick in Alaska had consuming a crane fly after capture; it eventually abandoned the invertebrate.

Studies from arctic and alpine areas in Northern Europe and Alaska report moss sporophyte capsules (usually *Polytrichum* and *Pohlia* species) in the diet of young ptarmigan chicks (Gardarsson and Moss 1970; Pullianen and Eskonen 1982; Spidsø 1980; Watson 1964; Weeden 1959, 1969). Our study is the first published record of ptarmigan chicks eating

TABLE 1. Crop or gizzard contents of Willow Ptarmigan chicks from La Pérouse Bay, Manitoba, Jul. 1981–1984. Values shown are the number of capsules, complete plant fragments and berries or seeds. Dry mass (mg in brackets); values < 1 mg are not reported.

Age ¹ (d)	Date	Time of day	Moss capsules	Willow leaf fragments	Other plant material	Inverte- brate ² pieces
6	6 Jul. 1984	1135	1	—	—	—
9	11 Jul. 1981	1500	263 (54)	3 (2)	8 ³ (6)	T (2)
13	16 Jul. 1984	1019	2	2 (2)	—	T
14	26 Jul. 1981	1940	302 (65)	~15 (394)	9 ⁴ (283)	T
14	18 Jul. 1982	1450	29 (6)	79 (1468)	—	T
16 ⁵	14 Jul. 1982	1050	20 (2)	* (71)	18 ³ (21)	T

¹ Age calculated directly as chicks were tagged on day of hatch.

² Trace amount.

³ Small seeds from *Arctostaphylos rubra* berries.

⁴ Entire *A. rubra* berries (approx. 72 seeds).

⁵ Gizzard sample.

* Numerous small fragments (1–2 mm).

moss sporophyte capsules in northern Canada. Five of 17 Willow Ptarmigan chicks 1–18 d old consumed bryophyte capsules at the Chilkat Pass, northwestern British Columbia (similar latitude to La Pérouse Bay but a considerably drier site) (Hannon et al. 1988), however, and here, mosses accounted for about 3% of dry weights of the crop contents (S. J. Hannon and W. Hunt, unpubl. data).

Moss capsules may represent a source of high quality food (Pullianen and Eskonen 1982) for young ptarmigan chicks at a time when handling of large of mobile food items would be difficult for them. Pakarinen and Vitt (1974) reported that the sporophyte capsules of many mosses in the Canadian Arctic contain about 30% lipids; higher than corresponding values for vascular plants. Our data are qualitative, but the chicks we collected had consumed moss capsules in all 3 yr, suggesting that mosses are a regular food of Willow Ptarmigan chicks at La Pérouse Bay. In two cases the large numbers of capsules consumed suggest food selection rather than accidental ingestion. Moss capsules may be an important dietary component for young chicks in northern areas.

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