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DIETS OF YOUNG LAPLAND LONGSPURS IN ARCTIC AND SUBARCTIC ALASKA

T. R. SEASTEDT

Extensive data are available on the breeding biology of Lapland Longspurs (*Calcarius lapponicus*) nesting in arctic tundra near Barrow, Alaska (Custer and Pitelka 1977, 1978, Seastedt and MacLean 1979). Those studies emphasized the close relationship between nesting chronology and the availability of food resources, especially those provided by the crane fly, *Tipula carinifrons*. Custer and Pitelka (1977) suggested that reproductive success at Barrow was contingent upon fledglings reaching self-sufficiency before the end of the brief period of adult crane fly abundance. Here, I compare the nestling and fledgling diet of Lapland Longspurs at Barrow with data obtained from a subarctic site. Differences in diet suggest a difference in preferred feeding habitat and a change in the timing of nesting with respect to adult crane fly emergence.

The subarctic site was located at Old Chevak (61°26′N, 165°27′W) within the Clarence Rhode National Wildlife Refuge on the delta of the Yukon and Kuskokwim rivers. The site differed markedly from the Barrow area: lowland areas were more sparsely vegetated and subjected to spring tides; upland tundra consisted of large, contiguous areas of mosses and lichens, and discrete ice-wedge polygons were absent. Vegetation of the Old Chevak area has been described by Mickelson (1975); Holmes (1970) obtained climatic data 16 km north of the present subarctic study site.

Prey items fed to nestlings and fledglings were collected with the pipe-cleaner ligature method (Hussell 1972). Attempts to obtain food items from nestlings less than four days old were largely unsuccessful. Young longspurs leave the nest when they are about eight days old but remain flightless until about day 12 (Maher 1964). Therefore, wire mesh enclosures were used to contain fledglings during this interval. Samples were obtained from five nests at each site. Data obtained from the Old Chevak area, collected between 11 June and 1 July 1976, were compared with those reported from Barrow by Seastedt and MacLean (1979), collected between 25 June and 20 July 1975.

Over 90% of the biomass of the nestling and fledgling diet at Old Chevak was composed of crane flies (*Prionocera* spp.; Table 1). These species (*P. parryi* and *P.* n. sp.; G. W. Byers, University of Kansas, pers. comm. to S. F. MacLean, Jr.), are semi-aquatic crane flies associated with wet, lowland habitats. In contrast, the longspur diet at Barrow was dominated by *Tipula carinifrons*, crane flies found primarily in mesic and upland habitats (MacLean and Pitelka 1971, Clement 1975). Sawflies (Tenthredinidae), found primarily on willows in mesic areas, were of secondary importance at Barrow, but were nearly absent from the longspur diet at Old Chevak. Other prey items of some importance at one or both sites included another crane fly (*Pedicia hannai*), midges, muscoid flies and spiders. Overall, the amount of diet overlap as measured by the percent of biomass shared in common at the two sites was only 12.4%.

A second contrasting feature of the nestling and fledgling diets at the two sites was the difference in life form of the prey. Adult crane flies composed 36% of the total crane fly biomass at Barrow, whereas they composed 83% of the total at Old Chevak. Adult crane flies became the dominant prey of the nestling diet at Old Chevak on 15 June, four days after the first eggs hatched. Adult crane flies at Barrow dominated the diet after 11 July, 16 days after the first eggs hatched. Little variation has been reported in the mean dates of crane fly emergence at Barrow (MacLean and Pitelka 1971), and the nesting chronology of longspurs at Barrow appears to be synchronized with crane fly pupation and adult emergence (Custer and Pitelka 1977).

Data reported here are based on a single field season at Old Chevak, and conclusions are tentative. However, these findings can be interpreted on the basis of those data that are available on arthropod abundance in the subarctic, and on information regarding the ability of longspurs to exploit this resource. Holmes (1970) reported that lowland areas were more productive in arthropod biomass than were uplands at his nearby subarctic site. High densities of upland crane fly species were not found in the subarctic. The opposite pattern is generally true at Barrow, and longspurs continue to feed in mesic and upland areas even during the occasional year when lowlands contain more crane flies (Seastedt and MacLean 1979). Custer and Pitelka (1978) noted that the conical fringillid bill of longspurs restricts these birds to mostly surface feeding. Longspurs may obtain *Tipula* larvae and pupae by searching and picking through mosses and lichens; however,

TABLE 1. Prey items obtained from young Lapland Longspurs.[1]

	Barrow (1975)		Old Chevak (1976)	
Arthropod taxa	Number	% of biomass	Number	% of biomass
Tipula carinifrons				
larvae	12	6.2	0	0
pupae	95	36.9	1	0.1
adults	48	15.6	8	1.3
Prionocera spp.				
larvae	0	0	13	5.2
pupae	0	0	31	10.1
adults	17	6.9	258	76.2
Pedicia hannai				
larvae	5	0.5	0	0
adults	66	2.4	9	0.1
Tenthredinidae				
larvae	81	10.2	0	0
adults	140	4.7	3	0.1
Small Nematocera (midges)	978	4.8	516	2.3
Muscoid flies	285	5.3	13	0.1
Araneida (spiders)				
Linyphiidae	122	4.7	1	0.0
Lycosidae	0	0	24	3.1
Others	33	1.8	8	1.4
TOTAL	1,882	100.0	885	100.0

[1] Arthropod weights are reported in Custer and Pitelka (1978) and Seastedt and MacLean (1979).

they appear unable to probe wet areas for *Prionocera* immatures. Lowlands at Old Chevak appeared more sparsely vegetated than lowland meadows at Barrow, and these subarctic lowlands may have been more accessible to longspurs than those at Barrow. However, data reported in Table 1 indicate that birds obtained mostly adult prey. Subarctic crane fly larvae and pupae, while abundant in lowlands, may be unavailable to longspurs. Thus, in order to provide adequate food for nestlings in the subarctic, egg laying may be delayed in order to synchronize hatching with the emergence of adult crane flies. No data are available on the diet of young longspurs following fledging; however, the warmer and longer summer environment at Old Chevak is likely to provide adequate food resources beyond the date when food becomes limited at Barrow. Unlike Barrow, then, nesting probably can be delayed without harming the survivorship of post-fledgling, young longspurs.

SUMMARY

Diets of young Lapland Longspurs in arctic and subarctic Alaska differed in species composition and the proportion of diet represented by adult crane flies. These findings suggest a difference in preferred feeding habitat and a difference in the nesting chronology with respect to the emergence of adult crane flies. The pattern of resource abundance and the ability for longspurs to exploit these resources are hypothesized as causal factors.

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Division of Life Sciences, University of Alaska, Fairbanks, Alaska. Present address: Institute of Ecology, University of Georgia, Athens, Georgia 30602. Accepted for publication 26 February 1980.