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Snowy Egret in the Strait of Magellan

NATHANIEL T. WHEELWRIGHT

Department of Zoology, University of Washington, Seattle, Washington 98195 USA

On 24 May 1976 I observed a Snowy Egret (*Egretta thula*) foraging along the shore of a small island off Península Córdoba, Isla Riesco, in the Province of Magallanes, Chile (53°0'S, 73°30'W). A. W. Johnson (1965, *The Birds of Chile*, vol. 1, Buenos Aires) describes the Snowy Egret in Chile "as a resident only as far south as Valdivia and as a casual visitor to Llanquihue and Chiloé." This sighting therefore occurred south of the known range of the Snowy Egret by more than 1,000 km.

During the voyage from Puerto Montt to Punta Arenas the vessel, 'El Navarino,' passed through the narrow channel within 40 m of the shore. From that distance I could easily distinguish the black legs and bright yellow toes characteristic of the Snowy Egret.

The current known distribution of the widely dispersed Snowy Egret extends, at least casually, from Alaska (Nelson 1958, *Condor* 60: 142) and Alberta (Weseloh 1972, *Blue Jay* 30:29) to the southern tip of South America.

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Undependable Breeding Conditions in the Red Phalarope

HAROLD F. MAYFIELD

9235 River Road, Waterville, Ohio 43566 USA

Unreliable breeding conditions place a premium on female ability to produce additional and replacement clutches, and therefore may foster female emancipation from care of eggs and young, and polyandry (Emlen and Oring 1977). The Red Phalarope (*Phalaropus fulicarius*) presents one of the rare examples of these circumstances among birds.

Red Phalaropes I studied on Bathurst Island in the Canadian high arctic showed wide fluctuations from year to year in breeding population and nesting success as a result of environmental factors. The capricious climate affected the accessibility of nesting sites and food, and arctic foxes (*Alopex lagopus*) brought severe losses to nests in years of fox abundance.

My work was conducted in Polar Bear Pass, 14 km inland from Goodsir Inlet (75°44'N, 98°25'W). Here I gave special attention to a rectangular tract $\frac{1}{2} \times 2$ km (1 km²) comprising some of the best habitat in the region for phalaropes. I stalked the birds daily, watched them from blinds, and attempted to find all nests in the plot. In years when I was not present, field companions from other seasons continued to supply information, particularly Pierre Lamothe for 1972 and John Geale for 1974, 1975, and 1976. Their estimates of breeding activity here were based on birds seen as well as nests found. The Northern Phalarope (*Phalaropus lobatus*) does not occur here regularly.

Phalarope nests on the area fluctuated during 7 consecutive years, 1970-1971, as follows: 6, 14, 0, 8,

0, 2, 4. I believe this sample reflected approximately the variations in nesting attempts by the entire local population numbering in the order of 100 birds.

Cold weather with delayed melting of snow marked the summers of 1972 and 1974 when no phalaropes nested on the tract. Indeed, these were disastrous nesting seasons for all the birds of the wet flats, with snow cover persisting into early July when female phalaropes usually are departing from the area. Cold weather reduced the availability of nesting sites as well as food. Although wind and sun cleared most of the hillsides and pockets of lowland where the surface was darkened with dust, the main expanses of wet tundra were still covered and ponds still frozen long after the time for nests. Phalaropes in small numbers reconnoitered the area but did not stay.

The unreliability of arctic summer weather is notorious. In Northeast Greenland, where Red Phalaropes nest, Bird and Bird (1940) noted one "nonbreeding year" in three. In the low arctic Sutton (with Semple 1932 and Parmelee 1954) noted severe disruptions of nesting by bad weather; at Churchill on Hudson Bay 15 cm of snow with drifting occurred on 18 June 1931 after most birds were incubating eggs, and at Frobisher Bay on Baffin Island a prolonged cold spell in July 1953 so reduced the insect populations that many passerine nestlings starved.

The effects of an unfavorable turn in weather may bear particularly hard on the Red Phalarope because of its tendency to specialize more narrowly on one form of food than availability alone would seem to dictate. Feast-or-famine regimes are characteristic of one-product economies. Even though a bird may have the ability to survive on substitute fare, it may not be able to maintain the high level of nutrition needed for successful nesting. Adaptation to an undependable food supply was suggested by the departure of the female phalaropes from the nesting region before the males, and the departure of males before the juveniles, leaving a minimum of consumers at each stage.

When phalaropes arrived on Bathurst Island in mid-June, ponds were usually frozen and mossy hummocks were barely protruding through the snow on the flats. At this time phalaropes fed by pecking at exposed vegetation. A Red Phalarope stomach collected here by Sutton on 20 July 1969 contained nothing but spider fragments, with no trace of springtails (Collembola), although Snow Buntings (*Plectrophenax nivalis*) were feeding on them at the time (Danks 1971). Later in the summer phalaropes subsisted mainly on midges (Chironomidae), first in the larval and then in the adult stage. As the thaw progressed, water-soaked hummocks emerged and lakes and ponds flooded their margins, detaching masses of vegetation from their anchorage and floating them to the surface. Phalaropes probed deeply into these masses gathering chironomid larvae.

Then in early July adult chironomids usually began to emerge and phalaropes concentrated on them, gathering the tiny insects mainly from the fresh shoots of sedges emerging from shallow water. Later when males led the newly hatched chicks to pond edges, the young gathered food in the same way. Stomachs of two adult female Red Phalaropes collected 11 July 1973 were filled almost entirely with sclerotized remains of adult midges of several species. Present also were a few oribatid mites, a few mouthparts of spiders, and a bit of moss, but no larval midges nor aquatic Crustacea (Bruce Heming, pers. comm.). At this time other invertebrate foods were being gathered by birds with other feeding (and breeding) habits in the same locality, notably Snow Buntings and Black-bellied Plovers (*Pluvialis squatarola*). No mosquitos live here, and phalaropes gathered little food by spinning and picking at the surface of the water, the feeding habit for which the family is famous.

In addition to uncertainties caused by weather, phalaropes were subject to predation that at times was severe. On Bathurst Island the principal agent of nest destruction was the arctic fox. In 1970 foxes were scarce and I noted no losses among eight nests during the period of observation. In 1971 foxes were abundant and 14 out of 18 nests were destroyed; and again in 1973 foxes were numerous and 9 out of 15 nests were destroyed. In my sample extending over three summers the hatching rate was about 25% of eggs laid, a rate much lower than others have reported for arctic shorebirds (Mayfield unpublished).

The pair bond terminated very quickly after males began incubating eggs. At this time females still in breeding condition were freed and available for second matings if opportunity presented. My constant observation of a small group of nesting birds caused me to suspect this happened in at least three instances, but the birds were not marked and I could not be sure. One of two females collected 11 July 1973 had post-ovulatory scars showing it had laid two clutches of four eggs in rapid succession (Robert B. Payne, pers. comm.). Subsequently, Schamel and Tracy (1977) proved with banded birds that polyandry sometimes occurred in this species at Barrow, Alaska. Polyandry already had been reported for the Northern Phalarope in Finland (Raner 1972, Hildén and Vuolanto 1972: 26-72).

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Metabolic Heat Production in the Chukar Partridge

M. L. LAUDENSLAGER¹ AND H. T. HAMMEL

*Physiological Research Lab, Scripps Institution of Oceanography
University of California, La Jolla, California 92093 USA*

The Barbary dove (*Streptopelia risoria*) prefers environmental temperatures within its physiological thermoneutral zone (Budgell 1971). The Chukar (*Alectoris graeca*) demonstrates a preferred environmental temperature of 26-31°C (Laudenslager and Hammel 1977). The present study describes metabolic measurements in the Chukar which indicate that the physiological thermoneutral zone of this species also corresponds closely to its preferred temperature range.

Three adult male Chukars, weighing 632-662 g at the beginning of the study, were obtained from a local game bird breeder. Each bird was housed individually in an environmental chamber maintained at 23 ± 1°C. Testing took place at the same time each day during the light phase of a LD 8:16 light cycle. Birds were deprived of food for 18 h prior to all metabolic measurements; otherwise Purina layena game bird chow and water were available *ad libitum*. The birds were tested individually in a sealed 8-l desiccator jar through which dried (relative humidity < 1%) outside air was drawn at 1.8-2.2 l/min. The jar was placed in a lighted environmental chamber, maintained within ± 0.5°C of test temperatures. Oxygen consumption was measured in an open flow system with a Beckman F-3 paramagnetic oxygen analyzer, calibrated by a partial pressure method (Hammel and Hardy 1963). Heat production was determined from the average rate of oxygen consumption assuming a RQ of 0.80 and 10 ml of oxygen consumed/min as equivalent to 3.38 W. The output of the oxygen analyzer was either recorded on a potentiometric recorder (Leeds and Northrup) for later analysis or entered on-line into an A to D converter for immediate processing by a Data General Nova II computer. The first 20-30 min of any test were discarded as an equilibration period, and the average rate of oxygen consumption was determined over the following 90 min. Each bird was tested at least two times at each of the following ambient temperatures (T_a): -3.5, 0, 4.5, 12, 16.5, 21.5, 24.5, 31, and 35°C. Only one T_a was tested on any day, and tests were separated by at least 48 h. Cloacal temperature (T_{cl}) was measured with a Yellow Springs Instrument Telethermometer before and after each test with the probe inserted 6 cm.

Figure 1 illustrates the average heat production of the Chukars at the T_as tested. The average T_{cl} (N = 62) prior to testing was 41.81 ± 0.21°C (±SD). Post-test T_{cl} was not different from pretest T_{cl} for any of the T_as tested (*t*-tests, *P* > .05); post-test T_{cl} (N = 62) for all T_as averaged 41.86 ± 0.30°C (±SD). The lowest rates of heat production were observed at T_as of 24.5°C and 31°C. The broken line in Fig.

¹ Present address: Department of Psychology, University of California, Santa Barbara, California 93106 USA.