LITERATURE CITED

AMERICAN ORNITHOLOGISTS' UNION. 1957. Check-list of North American birds, fifth ed. Baltimore, Amer. Ornithol. Union.

BENT, A. C. 1938. Life histories of North American birds of prey, part 2. U. S. Natl. Mus. Bull. 170.

HAVERSCHMIDT, F. 1946. Observations on the breeding of the Little Owl. Ardea 34: 214–246.

JACOT, E. C. 1931. Notes on the Spotted and Flammulated Screech Owls in Arizona. Condor 33: 8–11.

LIGON, J. D. 1968. The biology of the Elf Owl, *Micrathene whitneyi*. Univ. Michigan Mus. Zool. Misc. Publ. 136.

MARSHALL, J. T., JR. 1957. Birds of the pine-oak woodland in southern Arizona and adjacent Mexico. Pacific Coast Avifauna No. 32.

MARSHALL, J. T., JR. 1967. Parallel variation in North American and Middle American Screech Owls. Western Found. Vert. Zool. Monogr. No. 1.

MARTIN, D. J. 1973. A spectrographic analysis of Burrowing Owl vocalizations. Auk 90: 564–578.

MCQUEEN, L. B. 1972. Observations on copulatory behavior of a pair of Screech Owls (*Otus asio*). Condor 74: 101.

DENNIS J. MARTIN, *Department of Zoology, Utah State University, Logan, Utah 84322.* Accepted 18 Jun. 73.

Abnormal bill of a White-winged Crossbill.—Crossbills (*Loxia*) depend on the special shape of their bill to extract seeds from conifer cones. In interior Alaska the predominant crossbill is the White-winged (*L. leucoptera*), which feeds on the seeds of spruce (*Picea*). Observations show it prefers the white spruce (*P. glauca*) over the black spruce (*P. mariana*) or tamarack (*Larix laracina*). During the winter of 1972–1973, White-winged Crossbills were relatively abundant in the Fairbanks, Alaska area (64° 54′ N, 147° 48′ W), which correlated with a good spruce cone crop.

On 11 February 1973, I found a green plumaged (sex undeterminable) White-winged Crossbill behind some sheets of plywood next to my house in Fairbanks. The bird had been dead for some time and had undergone freeze-drying in the winter cold so that it weighed only 9 g. There were no signs of insect attack or other evidence that the bird died during the warmer summer months (i.e. before 1 September). The bird's bill was grossly deformed (Figure 1) so that the upper mandible extended 15.2 mm beyond the lower mandible. It is hard to imagine how the bird could have survived as long as it did. The gizzard contained only grit.

There are altogether three smooth worn sections along the length of the upper mandible that were probably formed by the continual rubbing action of the two mandibles. From Figure 1, one can see that the bird first utilized the most distal surface, then as the bill grew longer, the second, and at the time of its death was wearing away a third surface.

There is no question that this bird's bill is of unusual shape. In a comparison with measurements made of 16 adult male and female White-winged Crossbills from the Biological Collections of the University of Alaska, which were collected in interior Alaska and adjacent Yukon Territory, the upper mandible of the abnormal individual is almost 10 mm longer and 0.6 mm narrower while the lower mandible

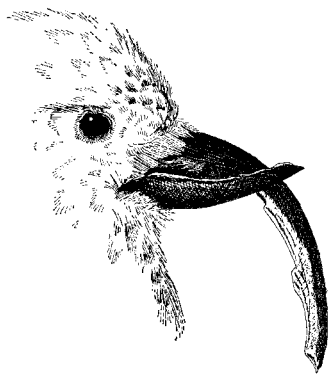

Figure 1. Abnormal bill of White-winged Crossbill found at Fairbanks, Alaska.

is 4.3 mm longer and 0.5 mm narrower than the average of the 16 normal birds (Table 1). The rhamphothecal sheath was removed from the abnormal bill and there was no indication that the bony portion of either maxilla or mandible had grown beyond normal length.

Values of linear growth of abnormal rhampothecal projections which were not subjected to wear on the bills of Tree Sparrows (*Spizella arborea*) caged at high ambient temperatures (West 1959, Auk 76: 534) were calculated to be 3.4 to 3.9 mm/44 days or 0.08 to 0.09 mm/day. At this rate, the upper mandible of the crossbill, which extended 15.2 mm beyond the lower mandible, would have taken 170 to 190 days or about 6 months to develop. The two worn surfaces of the upper mandible measure about 5 mm in length and at the rate noted above, would have taken about 60 days to form. We do not know if the tip of the bill was longer and had broken off prior to the bird's death.

It seems doubtful to me that the rhamphothecal growth rates measured on Tree Sparrows even at high ambient temperatures (35 to 39.5° C) are rapid enough to account for the extensive growth of the bill of this crossbill. No measurements of bill growth rates of crossbills are available to my knowledge and I can only hypothesize that the bill of a crossbill would grow faster than that of a Tree Sparrow because the crossbill continually wears its bill by the rubbing action of the two mandibles.

Also 6 months as a minimum time for the bird to survive with such an ab-

TABLE 1

DIMENSIONS OF THE BILL OF AN ABNORMAL WHITE-WINGED CROSSBILL COMPARED TO THOSE OF NORMAL INDIVIDUALS

	Upper mandible			Lower mandible	
	Length, nares to tip mm ± 1 SD	Depth at nares mm ± 1 SD	Width at nares mm ± 1 SD	Length from notch (gonys) mm ± 1 SD	Width at level of nares mm ± 1 SD
Abnormal	23.12	5.12	4.55	14.06	4.98
Normal (16)	13.72 ± 0.59	5.30 ± 0.20	5.19 ± 0.29	9.73 ± 0.57	5.48 ± 0.28

normality seems rather long when one considers the cold climate and requisite energy intake in the form of seeds that must be extracted by a specialized bill from the cones of coniferous trees.

The skeleton of the individual has been preserved in the Biological Collections, University of Alaska.—GEORGE C. WEST, *Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska 99701.* Accepted 25 Jun. 73.

Breeding of the Green-bellied Hummingbird.—On 21 February 1970 near Moco Moco creek in the Kanuka Mountains of southern Guyana at approximately 85 m elevation we found a nest of the Green-bellied Hummingbird (*Amazilia viridigaster*), which has not previously been described. The nest contained two half-fledged young, and we had good views of the parent returning to feed the nestlings. The nest was in a small tree growing from a rocky cleft beside a waterfall, and was fixed by cobwebs to two fine twigs near the end of a side branch, 3 m above the ground.

After the young had left we collected the nest. It is a typical hummingbird cup nest with an outer layer of moss encased by cobwebs, some lichen decorations, and a lining of a thick layer of tawny-colored vegetable down. Its dimensions are: internal diameter of cup 30 mm, depth of cup 14 mm, total depth of nest 28 mm.

During our 3 months' residence at Moco Moco creek (January–April 1970), we saw Green-bellied Hummingbirds often. Two were trapped, weighed (4.1 g and 3.9 g), and color-photographed. Identification was confirmed by comparison of the photographs with museum specimens. One bird caught at the end of January was not molting; the other, trapped on 21 March, was nearing the completion of its wing molt. Previous records of this species from Guyana are from the Merume Mountains and Quonga (Snyder 1966, The birds of Guyana, Salem, Massachusetts, Peabody Mus.). The present record extends the known range in Guyana about 80 miles to the south.—BARBARA K. SNOW and D. W. SNOW, *Old Forge, Wingrave, Aylesbury, Buckinghamshire, England.* Accepted 26 Jun. 73.

Puna bird species on the coast of Peru.—Observers on the coast of Peru have documented the presence of at least 10 bird species that nest only in the puna zone of the high Andes. Of these species only two can be called regular altitudinal migrants. This paper summarizes the known records of puna species on the Peruvian coast and offers some possible interpretations for the patterns that appear.

The puna zone of the Peruvian Andes (3,500 m to snowline) is an extensive expanse of grassy pampas (plains) and valleys, rocky slopes, lagunas (lakes), and boggy steppes. This zone extends from the Department of Cajamarca in northern Peru south through the Department of Puno on into Bolivia, Argentina, and Chile. In Peru the puna zone exhibits moderate seasonal fluctuations in temperature (Table 1). Precipitation is markedly seasonal, with 80–90% of the annual precipitation falling from the end of November to mid-April. Annual precipitation varies considerably from year to year. Over a 20-year period (1953–72), the weather station at Puno (Granja Salcedo), Department of Puno, had an annual mean rainfall of 618.2 mm and extremes of 481.7 mm and 996.7 mm for the driest and wettest years. The mean annual rainfall decreases on a north-south gradient (Table 2).